ANNEX B

ANALYSES REQUIRED BY WRDA 2000

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ANALYSES REQUIRED BY WRDA

B.1 LEGAL BASIS - Background

Federal law and regulation implementing the Comprehensive Everglades Restoration Plan (CERP) require Project Implementation Reports (PIRs) to address certain assurances as part of the project being recommended for approval and implementation. This section addresses provisions of Section 601(h) of the Water Resources Development Act of 2000 (WRDA 2000), the Programmatic Regulations for the CERP (33 CFR Part 385) for Savings Clause requirements and Project-Specific Assurances.

The following sections describe the specific requirements from WRDA 2000 and the CERP Programmatic Regulations and present the methods, results, and conclusions of the analyses necessary to meet those requirements.

B.1.1 Water Resources Development Act (WRDA 2000)

Congress enacted the WRDA 2000, Section 601, Comprehensive Everglades Restoration Plan, which approved CERP "as a framework for modifications and operational changes to the Central and Southern Florida (C&SF) Project that are needed to restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection." Section 601(h) of WRDA 2000, entitled, “Assurance of Project Benefits” establishes project-specific assurances to be addressed as part of CERP implementation.

Section 601 (h) (1) of WRDA 2000 provides the following:

> *IN GENERAL - The overarching objective of the Plan is the restoration, preservation, and protection of the South Florida Ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Plan shall be implemented to ensure the protection of water quality in, the reduction of the loss of fresh water from, the improvement of the environment of the South Florida Ecosystem and to achieve and maintain the benefits to the natural system and human environment described in the Plan, and required pursuant to this section, for as long as the project is authorized.*

In this document, Sections B.1 and B.1.1 discuss the savings clause and project assurances required by WRDA 2000 to be addressed in each PIR. Section B.1.2 lists the savings clause and project assurances provisions of the CERP programmatic regulations, which provide supplemental information for implementing the WRDA 2000. Section B.1.2.5 discusses the role of the Draft Guidance Memoranda in the analyses.

The Savings Clause analysis is listed in WRDA 2000 as a means to protect users of legal sources of water supply and to protect the levels of service for flood protection that were in place at the time of enactment. Specifically, Section 601(h)(5) of WRDA 2000, entitled “Savings Clause”, requires an analysis of each project’s effects on legal sources of water that were in existence on the date of enactment of WRDA 2000 (i.e., December 2000) and effects on levels of service of flood protection in existence on the date of enactment of WRDA 2000. Section 601(h) (5) of WRDA 2000 states the following:

> *(A) NO ELIMINATION OR TRANSFER. – Until a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act is available to replace the water to be lost as a result of implementation of the Plan, the Secretary and*

the non-Federal sponsor shall not eliminate or transfer existing legal sources of water, including those for –

(i) an agricultural or urban water supply;
(ii) allocation or entitlement to the Seminole Indian Tribe of Florida under section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e);
(iii) the Miccosukee Tribe of Indians of Florida;
(iv) water supply for Everglades National Park; or
(v) water supply for fish and wildlife.

(B) MAINTENANCE OF FLOOD PROTECTION. – Implementation of the Plan shall not reduce levels of service for flood protection that are –

(i) in existence on the date of enactment of this Act; and
(ii) in accordance with applicable law.

(C) NO EFFECT ON TRIBAL COMPACT. – Nothing in this section amends, alters, prevents, or otherwise abrogates rights of the Seminole Indian Tribe of Florida under the compact among the Seminole Tribe of Florida, the State, and the South Florida Water Management District, defining the scope and use of water rights of the Seminole Tribe of Florida, as codified in section 7 of the Seminole Indian Land Claims Act of 1987 (25 U.S.C. 1772e).

The analysis of project-specific assurances is listed in WRDA 2000 as a means to assure that CERP project benefits are realized by establishing the appropriate quantity, timing, and distribution of water to be dedicated and managed for the natural system. Section 601(h) (4) of WRDA 2000, entitled "Project-Specific Assurances", contains the following requirements for PIRs:

(A) PROJECT IMPLEMENTATION REPORTS. –

(i) IN GENERAL. – The Secretary (of the Army) and the non-Federal sponsor shall develop project implementation reports in accordance with Section 10.3.1 of the Plan.
(ii) COORDINATION. – In developing a project implementation report, the Secretary and the non-Federal sponsor shall coordinate with appropriate Federal, State, tribal, and local governments.
(iii) REQUIREMENTS. – A project implementation report shall –

…(IV) identify the appropriate quantity, timing, and distribution of water dedicated and managed for the natural system;
(V) identify the amount of water to be reserved or allocated for the natural system necessary to implement under State law;

WRDA 2000 excerpts cited above are intended to provide a concise summary of the Savings Clause and Project-specific Assurances analyses required under WRDA 2000. Refer to WRDA 2000 for complete text.

B.1.2 Programmatic Regulations (33 CFR PART 385)

Section 601(h)(3) of WRDA 2000 required the Secretary of the Army, with the concurrence of the Governor and the Secretary of the Interior, to promulgate Programmatic Regulations to ensure that the goals and objectives of the CERP are achieved. The Final Programmatic Regulations for the CERP, which were published in 33 CFR Part 385 in 2003, establish the processes and procedures to guide the U.S.

Army Corps of Engineers (Corps) in the implementation of the CERP. In this document, Section B.1.2 summarizes the requirements of the Programmatic Regulations that provide supplemental information to WRDA 2000.

B.1.2.1 Pre-CERP Baseline

Section 385.35(a) of the Programmatic Regulations requires the development of a pre-CERP baseline to aid the Corps and the South Florida Water Management District (SFWMD) when implementing the Savings Clause to determine if existing legal sources of water will be eliminated or transferred and to demonstrate that the levels of service of flood protection in existence on the date of enactment of WRDA 2000, and in accordance with applicable law, will not be reduced by implementation of a project.

B.1.2.2 Savings Clause - Elimination or Transfer of Existing Legal Sources of Water

Section 385.36 of the Programmatic Regulations requires that PIRs include a determination of existing legal sources of water that are to be eliminated or transferred as a result of project implementation. If a project is expected to result in an elimination or transfer of an existing legal source of water, the PIR shall include an implementation plan that ensures a new source of water of comparable quantity and quality is available to replace the source that is being transferred or eliminated.

B.1.2.3 Savings Clause - Flood Protection

Section 385.37 of the Programmatic Regulations requires that PIRs include an analysis of the project's impacts on levels of service for flood protection that existed on the date of enactment of WRDA 2000 (December 2000), and in accordance with applicable law. These conditions are included in the Pre-CERP Baseline.

B.1.2.4 Project Assurances - Identification of Water for the Natural System

Section 385.35(b) of the Programmatic Regulations requires that each PIR identify the quantity, timing, and distribution of water to be dedicated and managed for the natural system necessary to meet CERP restoration goals.

B.1.2.5 Project Assurances - Identification of Water for Other Water-Related Needs

Section 385.35(b) of the Programmatic Regulations also requires that procedures be developed for identifying water generated by CERP for use in the human environment. Identification of the quantity, timing, and distribution of this water for other water-related should be included in PIRs.

B.1.2.6 Draft Guidance Memoranda

The Programmatic Regulations require the development of six guidance memoranda jointly by the Corps and SFWMD in consultation with others. The Draft Guidance Memoranda dated July 2007 provided additional information to complete the analyses initially described in WRDA 2000; however, since the guidance memoranda exist in draft form only, the PIRs completed prior to their approval can use appropriate methods deemed reasonable at the time. The July 2007 Draft Guidance Memoranda are available for review at the following link:

http://www.evergladesplan.org/pm/progr_regs_guidance_memoranda.aspx

Section 385.35(b)(3)(iii) of the Programmatic Regulations specifically states that "PIRs approved before... the development of the guidance memorandum may use whatever method the Corps of Engineers and the non-Federal sponsor deem is reasonable and consistent with the provisions of Section 601 of WRDA 2000." During the preliminary planning phases of the CEPP project, based on consideration of the expedited schedule, the Corps and SFWMD advocated using efficiencies learned from the processes of

developing prior PIRs, including prior application of the Draft Guidance Memoranda 3 (Savings Clause Requirements) and 4 (Identifying Water Made Available for the Natural System and for Other Water-Related Needs). The two draft memoranda provide additional background information and describe the analyses and tools to address the savings clause and project assurances requirements of the Programmatic Regulations. Selected tools appropriate to the CEPP project scale and available were applied to conduct the necessary analyses. The analyses completed for the CEPP PIR, which are documented in Section B.2, Section B.3, and section B.4 within this Annex, meet the intent of the draft memoranda while fulfilling the requirements of Section 601 of WRDA 2000 and the Programmatic Regulations.

Section B.2.1 of this report contains the key assumptions common to savings clause and project assurance analyses including an overview of the modeling tools available, the scenario assumptions, and the regional project effects resulting from achieving the CEPP project objectives.

Section B.2.2 of this report contains a description of the assumptions, concept, and methodologies applied for the CEPP evaluation of Savings Clause requirements.

Section B.2.3 contains a description of the assumptions, concepts, and methodologies applied for the CEPP evaluations to identify water made available by the project for the natural system and for other water-related needs of the region.

Section B.3 describes the results of these analyses, while Section B.4 provides conclusions and identifies the amount of water made available by the project for the natural system to be reserved or allocated by the State of Florida and the amount of water made available for other water-related needs.

B.2 Methods

The same hydrologic models used for plan formulation are typically applied to the savings clause and project assurance analyses. This ensures consistency when representing the project effects in the analyses subsequent to plan selection. The Regional Simulation Model (RSM) for Basins (RSM-BN) and the RSM Glades-LECSA (RSM-GL) hydrologic models were used to simulate and evaluate the environmental effects of the CEPP final array of alternatives through comparison with pre-project base conditions simulated with the same models. The RSM-BN is applied north of the L-4/L-5/L-6 (the CEPP formulation redline) for Lake Okeechobee, the Everglades Agricultural Area (EAA), and the Northern Estuaries; the RSM-GL is applied within the Water Conservation Areas (WCAs), Everglades National Park (ENP), and the Lower East Coast Service Areas (LECSAs). The RSM models uses a 41-year period of hydrologic record (1965 through 2005) which includes sufficient climatological variability (including natural fluctuations of water) to represent the full range of hydrologic conditions experienced within the South Florida region over a long-term period. No one modeling tool or representation of model results can definitively predict with project hydrologic conditions across the entire CEPP project area given the large regional scope of the project, model tools limitations and assumptions, and future uncertainties regarding the effects of other projects. However, each snapshot of model results can form the basis for applying best professional judgment to determine whether the potential effects of CEPP would reduce the availability of existing source of water or reduce the level of service for flood protection and to quantify the water necessary to achieve the benefits of the plan.

The plan formulation process applied during CEPP analyzed the environmental effects and benefits of the project alternatives through qualitative and quantitative comparisons between the future without

(FWO) project condition and the future with project condition. The FWO project condition describes what is assumed to be in place if none of the study's alternative plans are implemented. The FWO project condition for CEPP assumes the construction and implementation of authorized CERP and non-CERP projects, and other Federal, state or local projects constructed or approved under existing governmental authorities that occur in the CEPP study area, as described in **Section 2.5** of the PIR main report. The future with project condition describes what is expected to occur as a result of implementing each alternative plan that is being considered in the study. Based on this formulation and evaluation approach, the CEPP alternatives were analyzed as the next–added increment of CERP projects to be added to a system of projects identified as likely to have been implemented prior to implementation of the CEPP project. The CEPP recommended plan (Alt 4R2) was formulated, evaluated, and justified based on the ability of the CEPP recommended plan: (1) to contribute to the goals and purposes of the CERP Plan, and (2) to provide benefits that justify costs on a next-added basis.

B.2.1 Project Objectives and Associated Baseline Model Assumptions

Viewed from a programmatic perspective, the identification of water for the natural system associated with the CERP involves an analysis of four different aspects of ecological responses to hydrologic changes: 1) responses to the change in the quantity of water received by the natural system; 2) responses to the timing of those deliveries; 3) responses to the distribution of water delivered to the natural system; and 4) responses to the quality of the water received by the natural system. In a project specific sense, however, the relative importance of each of these aspects (quantity, timing, distribution, and quality) will vary from project to project depending upon the specific objectives established for the project.

For example, some CERP projects may focus formulation efforts on simply changing the timing (i.e., seasonality) or distribution (i.e., inflow and outflow points or internal movement) of water delivered to the natural system. Other projects may focus primarily on increasing or decreasing the amount of water delivered to the natural system depending on its needs, while still other projects may focus on improving the quality of the water delivered to the natural system to maintain desirable ecological community structure. All of these aspects, depending upon their applicability to specific CERP projects, are addressed during plan formulation through performance measures and evaluation criteria used to evaluate alternative plans and ultimately select a plan. Hydrologic targets for the natural system applied during plan formulation help to identify the quantity of water required to meet restoration objectives, in contrast to water that exceeds the targets and may be harmful or otherwise not contribute to meeting the restoration targets.

CEPP achieves the project objectives by changing the timing, distribution, and volume of water conveyed, to the natural system. The large regional scale of the CEPP causes large volumes of water to move between ecosystems and basins consistent with the project's objectives (**Table B-1**). The water made available for the natural system is the water required for the protection of fish and wildlife within natural systems, including water that contributes to meeting hydrologic, water quality, and ecologic targets for natural system restoration. The savings clause and project assurances analyses will focus on whether these regional-scale changes do not meet the requirements of WRDA 2000 and the Programmatic Regulations.

Concurrent with development of the operational refinements to the National Ecosystem Restoration (NER) Plan, which is described in **Section 4.6.2** of the PIR main report, preparation for Savings Clause and Project Assurances analyses was initiated. The analyses of the Saving Clause and Project Assurance

requirements includes considerations of three different sets of assumptions at three different points in time or conditions as depicted in **Table B-2**. Following identification of the recommended plan in June 2013, the CEPP base condition assumptions established for plan formulation were subsequently revisited and updated to represent the most current information for the analysis of Savings Clause requirements and Project-Specific Assurances. Specifically, the Existing Condition Baseline (ECB) was updated to 2012EC and the Future Without Project baseline (FWO) was updated utilizing new information for the Initial Operating Regime Baseline (IORBL1). Comparison of the CEPP TSP (Alt 4R2) to these new baselines resulted in different trends as seen during plan formulation for selected areas as discussed in the results section below. The model assumption tables for all base conditions (ECB, 2012EC, FWO, and IORBL) and Alternative 4R2 are provided in Reference 2 of the Hydrologic Modeling Annex (A-2) to the Engineering Appendix (Appendix A).

The revised 2012 Existing Condition Baseline (2012EC) updated the ECB to include implementation of ERTP operations for WCA-3A and the South Dade Conveyance system, in addition to minor localized corrections to improve RSM-GL representation of the S-9/S-9A operations and the L-28 weir (all other ECB assumptions remain unchanged). The revised Initial Operating Regime Baseline (IORBL1) updated the FWO to include the 2.6 mile western Tamiami Trail bridge proposed with the initial increment of the DOI Tamiami Trail Next Steps Project (based on best available phased implementation information from DOI), operational updates to the CERP Indian River Lagoon South (IRLS) project (based on best available information from the IRLS project team), and operational refinements to the CERP Broward County Water Preserve Area project (to reduce excess discharges to tide via S-29, without the CERP Lake Belt reservoirs assumed in the CEPP FWO condition), in addition to the same minor localized corrections included with the 2012EC to improve RSM-GL representation of the S-9/S-9A operations and the L-28 weir (all other FWO assumptions remain unchanged). The 2012EC and the IORBL1 represent the existing condition baseline and future without project baseline assumptions for purposes of completing the CEPP assessments for the Savings Clause and Project Assurances. Compared to the FWO baseline, the updated IORBL1 baseline indicates significant hydrologic differences with respect to the Saint Lucie Estuary and Biscayne Bay, with other portions of the CEPP project area performing similar to the FWO; a summary of these performance differences between the FWO and IORBL1 is provided in Appendix C.2.2 for the St. Lucie Estuary and Biscayne Bay.

The CEPP PIR report documentation and two complete sets of RSM-BN and RSM-GL hydrologic model performance measure output are posted on the Everglades Plan public web site for the CERP:
http://www.evergladesplan.org/pm/projects/proj_51_cepp.aspx

The following complete performance measure data sets are provided to facilitate additional review of the hydrologic modeling output for the baselines and the TSP Alternative 4R2:

- ECB, FWO, Alternative 4R, Alternative 4R2 (comparison used for NEPA evaluation in Section 5 of the main PIR report)
- ECB, 2012EC, IORBL1, Alternative 4R2 (comparison used for the Savings Clause and Project Assurances evaluation in Annex B of the PIR report)

Table B-1. Comprehensive Everglades Planning Project (CEPP) Objectives and Regional Changes to Quantity, Timing, Distribution, and Quality of Water

CERP GOAL: Enhance Ecological Values	
CEPP Objective	**Resulting Effect of Recommended Project**
Restore seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades system.	Increase in water conveyed to WCA 3A and WCA 3B in the dry season, decrease in water conveyed to WCA 2A and WCA 2B, and change in timing to improve ability to meet hydropattern and water quality restoration targets.
Improve sheetflow patterns and surface water depths and durations in the Everglades system in order to reduce soil subsidence, the frequency of damaging peat fires, the decline of tree islands, and saltwater intrusion.	
Reduce high volume discharges from Lake Okeechobee to improve the quality of oyster and submerged aquatic vegetation (SAV) habitat in the Northern Estuaries.	Reduce high flow discharges to the Northern Estuaries by constructing increased water storage within the EAA, redirecting Lake Okeechobee discharges south for ultimate delivery to WCA 3A and the Everglades, and proposed minor modifications to the Lake Okeechobee Regulation Schedule that moderately increase the frequency, duration, and magnitude of peak lake stages.
Reduce water loss out of the natural system to promote appropriate dry season recession rates for wildlife utilization.	Increase in water conveyed to WCA 3A and WCA 3B, decrease in water conveyed to WCA 2A and WCA2B, change in timing to improve ability to meet hydropattern and water quality restoration targets, and increased canal discharges to Biscayne Bay.
Restore more natural water level responses to rainfall to promote plant and animal diversity and habitat function.	
CERP GOAL: Enhance Economic Values and Social Well Being	
Increase availability of water supply.	Increase water available in Lower East Coast Service Area 2 and Lower East Coast Service Area 3 for other water related needs.

Table B-2. Key Assumptions based on Summary Tables from EN Appendix and H&H Annex

Condition	Intent	Equivalent for Central Everglades Planning Project (CEPP)	Model Scenario
Pre-CERP Baseline	Conditions on the date of enactment of WRDA 2000 (December 2000), to provide a baseline to compare effects of project	Includes conditions in 2010 and most closely represents the Pre-CERP Baseline for LECSA 3, WCA 3 and ENP. Significant changed assumptions from the Pre-CERP Baseline include the 2008 Lake Okeechobee Regulation Schedule (LORS 2008) and the Interim Operating Plan (IOP) for WCA 3A and the South Dade Conveyance System (SDCS) in the existing conditions baseline (ECB). A Pre-CERP Baseline is not available with the RSM.	**ECB**
Existing Conditions	Actual conditions at the time the TSP is selected, including land use, operations, and demands. Demand can be either permitted or projected, whichever is greater.	2012 conditions with only the projects and operations approved and in effect. Includes LORS 2008 and the Everglades Restoration Transition Plan (ERTP) for WCA 3A and the SDCS. Permitted demands are included.	**2012EC**
Initial Operating Regime Baseline	Future conditions at the time the TSP is operational including land use, operations, and demands. Demands can be either permitted or projected, whichever is greater.	The future condition when the project will be initially operated, including other Non-CERP projects, CERP projects (with completed PIRs), and associated operations. Includes LORS 2008 and ERTP. Permitted demands are included.	**IORBL1**

B.2.1.1 Volume Probability Curves and Stage Duration Curves

To identify the quantity, timing, and distribution of water for the natural system, a probabilistic approach was selected utilizing volume probability curves to depict the distribution of volumes of water that provide natural system benefits as a result of project features or to determine whether water is eliminated or transferred from natural systems. These volumes of water may include water that is available to meet natural system needs without project features and the water made available from CEPP project features to meet natural system needs through the entire range of historic climatologic conditions. For purposes of identifying the increase in the volume of water for the natural system, volume probability curves were produced depicting the range of the quantities of water delivered for natural system areas and coastal estuaries under all climatic conditions through the RSM period of simulation used to perform project evaluations.

The volume probability curve indicates the probability (percentage of time equaled or exceeded, on the x-axis) that a certain quantity of water (expressed as flow or volume on the y-axis) is made available as a function of historical rainfall distribution. The water quantities are aggregated for each water year within the RSM period of simulation, defined as starting in May of year 1 and continuing through April of year 2 (40 total water years in the 1965-2005 RSM period of simulation). Once sorted, the values are ranked from highest to lowest. Volume probability curves quantify the water, along with its timing and distribution to the natural system.

To identify whether the CEPP project reduces the level of service of flood protection, evaluations focus on changes to water stages and their frequency within canals and at selected representative monitoring gauge locations within the LECSAs. The RSM-GL has no capability to precisely measure flood control on individual fields or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to

indicate a potential change in flood risk. Like volume probability curves, stage duration curves indicate the probability (percentage of time equaled or exceeded, on the x-axis) that a certain stage (expressed in National Geodetic Vertical Datum [NGVD] on the y-axis) is achieved as a function of historical rainfall distribution. Stages are aggregated for each day in the RSM period of simulation. Once sorted, the values are ranked from highest to lowest. A more localized analysis, with higher resolution hydrologic and/or hydraulic models, will be performed if there is an indication of significant increase in flood risk from the regional analysis.

B.2.2 Analyses for Savings Clause including Intervening non-CERP and CERP Projects

The Regional Changes to Quantity, Timing, Distribution, and Quality of Water proposed by the CEPP project, as described in Section B.2.1, focus on meeting hydrologic restoration targets for the Everglades (including WCA 2, WCA 3, and ENP) and Florida Bay. The purpose of the Savings Clause analyses is to confirm there will be no elimination or transfer of existing legal sources of water or reduction to the level of service of flood protection as a result of the project. By comparing stage duration curves and other results from the model simulations in sequential step-wise fashion, the effects of the CEPP project alone can be isolated from intervening non-CERP and/or other CERP project effects. If no reductions to existing legal sources or levels of service for flood protection are indicated at any sequential step during the comparison, then the savings clause requirements are determined to have been met.

Consistent with the approach outlined in draft Guidance Memoranda 3, which was developed to meet the intent of WRDA 2000 and the Programmatic Regulation, the following guidance will be applied by the CEPP to address the effects of intervening non-CERP activities:

- Savings Clause analysis only applies to changes from date of enactment of WRDA 2000 that result from “Implementation of the Plan”;
- Intervening non-CERP activities are changes wholly outside of CERP – e.g., LORS 2008, Modified Waters Deliveries to Everglades National Park (MWD), C-111 South Dade, IOP, ERTP, Everglades Construction Project (ECP), etc.;
- Savings Clause does not require CERP to make up for reductions in quantity or quality of existing legal sources or levels of service for flood protection caused by intervening non-CERP activities, but CERP cannot cause further reductions;
- Savings Clause does not prohibit CERP from reducing quantity or quality of existing legal sources or levels of service for flood protection increased by intervening non-CERP activities, but CERP cannot reduce those increases below those in place on the date of enactment of WRDA 2000.

To determine whether it is the CEPP or other intervening CERP or non-CERP activities are affecting the existing legal sources or levels of service for flood protection, where effects are observed, a series of comparison can be made between the appropriate base conditions and with project conditions. The first potential comparison to the representation of the existing condition at the time of the TSP selection (2012EC base condition) includes the effects of intervening non-CERP activities since it reflects 2012 conditions. The second potential comparison to the ECB, which represents system condition at the start of CEPP formulation in 2010-2011, does not include effects from implementation of the ERTP for WCA 3A and the SDCS (October 2012), an intervening non-CERP activity. The original Pre-CERP Baseline, which is not used for the CEPP analyses (RSM model representations were not developed), does not include the intervening non-CERP activities and does not reflect revised circumstances under which the project has been formulated and may be implemented.

The only model-based comparison that accurately reflects the effects of the CEPP project only is the Initial Operating Regime with the project (TSP Alternative 4R2) compared to the Initial Operating Regime without the project (IOR Baseline IORBL1). However, based on the plan formulation assumptions established for CEPP, the simulations for Alternative 4R2 and the IORBL1 also include the effects of intervening CERP activities that were assumed to be implemented prior to the CEPP for the future without project condition, including: Indian River Lagoon-South Project; Site 1 Impoundment Project; Biscayne Bay Coastal Wetlands Project; Broward County Water Preserve Areas Project; Caloosahatchee River (C-43) West Basin Storage Reservoir; and the C-111 Spreader Canal Western Project. Because of the incremental formulation of CERP projects contemplated by the Draft Guidance Memoranda formulation process, methods to assess the potential effects of intervening CERP activities were not specifically addressed in the Draft Guidance Memoranda. Since each of these CERP projects assumed for the CEPP future without project condition have completed PIR documents that demonstrate Savings Clause compliance for each of these projects, effects to existing legal sources or levels of service for flood protection that are observed in comparisons between the future without project condition (IORBL1) and the updated Existing Condition baseline (2012EC) shall not constitute a Savings Clause violation for CEPP. Non-CEPP Savings Clause impacts that are projected with implementation of these intervening CERP activities will need to be addressed during implementation of CERP projects, given the recognition that the Savings Clause evaluations included with each of the respective completed CERP PIRs may not represent conditions at the time of implementation of that project.

For the CEPP, the equivalent step-wise comparisons can be found in **Table B-3**.

Table B-3. Summary of Comparisons for Savings Clause for CEPP

Step	Base Condition Model Run	With Project Model Run
1	Existing Conditions Baseline – 2012EC	Initial Operating Regime – Alt 4R2
2	Existing Condition Baseline for formulation (2010) – ECB	Initial Operating Regime – Alt 4R2
3	Initial Operating Regime without the project – IORBL1	Initial Operating Regime – Alt 4R2
If no reduction at any step, then requirements of Savings Clause have been met.		

In this analysis, the focus is to determine the potential effects of CEPP, and the analysis therefore compares the Initial Operating Regime with the project (Alt 4R2) to the Initial Operating Regime baseline without the project (IORBL1). This comparison segregates the effects of the intervening CERP and intervening non-CERP projects. In addition, Alternative 4R2 is also compared to the two existing baseline conditions (2012EC and ECB). This additional analysis informs evaluators of the cumulative potential effects of both CEPP and other intervening CERP and non-CERP projects relative to conditions experienced previously.

B.2.2.1 Savings Clause – Elimination or Transfer of Existing Legal Sources of Water

To analyze the potential elimination or transfer of existing legal sources, affected basins or users are evaluated. The basins and users that may be affected by the project are displayed in **Table B-4,** classified according to the categories identified in WRDA 2000.

Table B-4. Existing Legal Sources Evaluated for Elimination and Transfer of Existing Legal Sources

WRDA 2000, Section 601(h)(5)	User or Natural System Evaluated in CEPP
(i) an agricultural or urban water supply;	• Lake Okeechobee Service Area (LOSA), including the Everglades Agricultural Area (EAA) • Lower East Coast Service Area 2 (LECSA-2) • Lower East Coast Service Area 3 (LECSA-3)
(ii) allocation or entitlement to the Seminole Indian Tribe of Florida under section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e);	Implementation of the project will not reduce the levels of service for flood protection within the areas affected by the project including
(iii) the Miccosukee Tribe of Indians of Florida;	• Implementation of the project will not reduce the levels of service for flood protection within the areas affected by the project including
(iv) water supply for Everglades National Park; or	• ENP
(v) water supply for fish and wildlife.	• Caloosahatchee Estuary • St. Lucie Estuary • WCAs 2 and 3 • Biscayne Bay • Florida Bay

The primary RSM-BN and RSM-GL model results evaluated for effects to agricultural or urban water supply are the volume and/or frequency of cutbacks, which is applicable to the Lake Okeechobee Service Area (LOSA), Lower East Coast Service Areas (LECSAs), and the Seminole Tribe of Florida's Brighton and Big Cypress reservations. Additional information available to evaluate agricultural and urban water supplies includes regional groundwater differences maps, seepage volumes across the East Coast Protective Levee (ECPL), regional water supply deliveries, and canal stages near public water supply wellfields. These metrics are indicators of whether the water supply demand in the LECSAs can continue to be met by the regional system, including Lake Okeechobee, the WCAs, and the surficial aquifer system. The selected metrics provide more direct and higher resolution measures of potential water supply effects for the CEPP Savings Clause assessment than would be provided through assessment of inflow volume probability curves for each user group or basin. Analyses within the LECSAs are performed for LECSA 2 and 3 only (essentially Broward and Miami-Dade Counties, respectively) since these basins are affected by the CEPP. Significant changes to LECSA 1 (Palm Beach County) and the North Palm Beach Service Area are not indicated in the CEPP modeling comparisons, and WCA 1 remains unchanged. For the Miccosukee Tribe of Indians of Florida, stage duration curves for gauges in WCA 3 and hydropattern maps of WCA 3 are evaluated.

For ENP, the RSM-GL water year flows into ENP at the northern boundary will be compared. For the two Northern Estuaries, the analysis focuses on whether the project eliminates or reduces deliveries to meet the low flow criteria targets for the Northern Estuaries. The high flows to the estuaries are not subject to a Savings Clause analysis because these flows are damaging to the estuaries, and one of the CEPP objectives is for reduction of damaging high flows. For WCA 2 and WCA 3, the change in flows relative to CEPP objectives was evaluated. In additional, the hydrologic performance in WCA 2A consistent the mitigation associated with the pre-CEPP construction and operation of Compartment B of the ECP Stormwater Treatment Area (STA) 2 was also evaluated. For Biscayne Bay, the total water conveyed

through coastal structures grouped by spatial regions (North, Central, South-Central, and South) within the bay is evaluated. The South-Central region flows were also compared to the target flows identified in the Biscayne Bay Water Reservation Rule recently adopted by the SFWMD. The overland flows to Florida Bay at selected transects, Transect 27 for western Florida Bay and Transect 23 (including T23A, 2T3B, and T23C) for east/central Florida Bay), were also evaluated (**Figure B-1**).

In addition to the potential effects of changing the timing, distribution, or quantity of water due to CEPP implementation, the CEPP project features can directly impact the availability of water supplies. In CEPP, backfilling the Miami Canal directly affects the ability to convey water to the LECSA to meet agricultural and urban needs under certain conditions. The potential to limit conveyance options was evaluated by identifying alternatives routes and their capacities.

B.2.2.2 Savings Clause - Flood Protection

Flood protection is evaluated by a combination of best professional judgment interpreting model results and engineering analyses. Consistent with the guidance memorandum, the same models and results used for plan formation were applied for the CEPP Savings Clause assessment. This varies from typical storm event analyses by using a long-period of record simulation and focusing on the wet events. The four features or areas affected by the project that will be analyzed include 1) the potential risk to Herbert Hoover Dike (HHD) due to changes in the Lake Okeechobee stages, 2) the Flow Equalization Basin (FEB) located in the EAA, 3) the effects of changed water levels in WCA 3A and WCA 3B on the Everglades Protective levees (L-31N and L-31W), L-67, L-29, and L-30, and 4) the agricultural and urban areas located east of the Everglades Protective levees L-31N and L-31W.

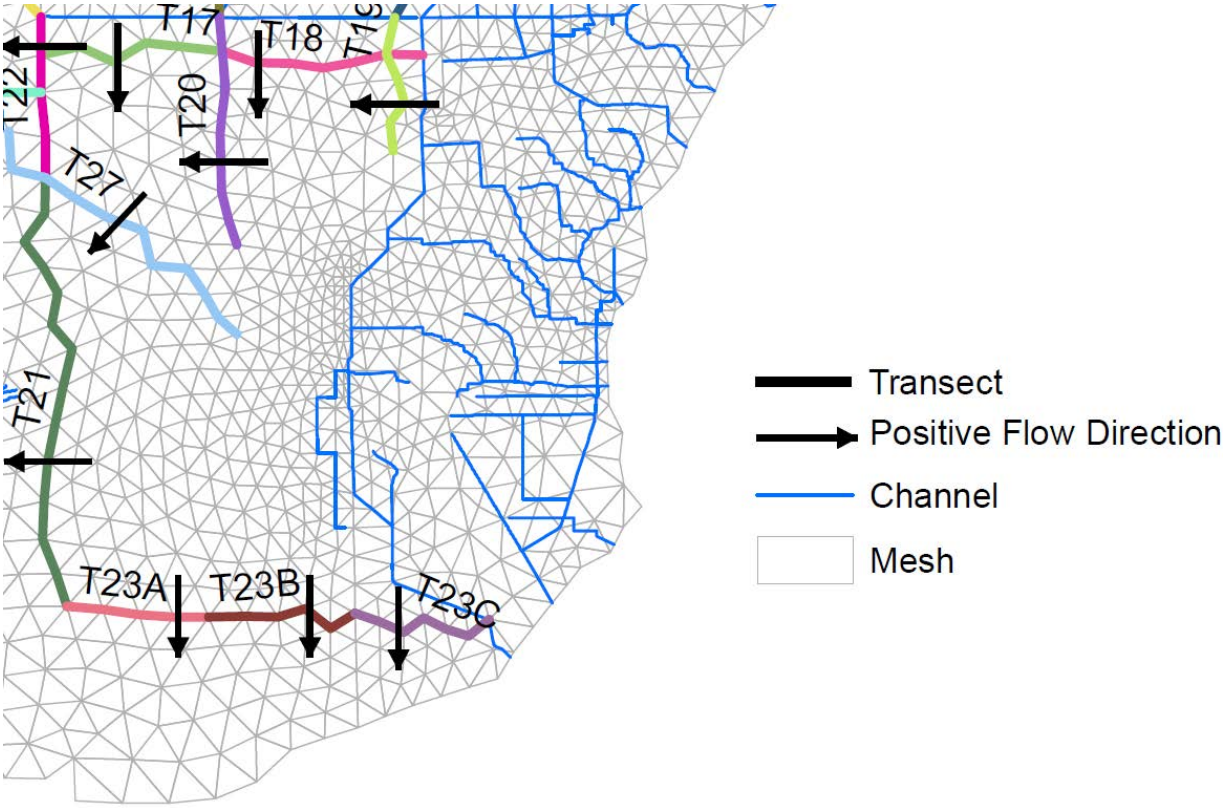

Figure B-1. Location Map for RSM-GL Transects Used for Florida Bay Analysis

Lake Okeechobee Herbert Hoover Dike

For the HHD, risk and uncertainty associated with increased lake stages were assessed consistent with the HHD formulation assumptions established for the CEPP future without condition. There are structural integrity concerns with the embankment and internal culvert structures that resulted in a Dam Safety Action Classification (DSAC) risk rating of Level 1. DSAC Level 1 represents the highest USACE dam risk of failure rating and requires remedial action. The USACE Major Rehabilitation Report (MRR) from 2000 divided the 143 mile dike into eight (8) Reaches with the initial focus on Reach 1. The current approved and planned remediation measures will address the highest points of potential failure in the system based on known areas of concern. These USACE efforts are intended to lower the DSAC rating from Level 1. The CEPP future without project condition assumes the planned remediation of HHD will lower the DSAC risk rating and be completed by 2022. These remediation measures will not resolve all issues with the HHD dam, nor will all current design criteria be met. To assess other issues and address future modifications with HHD, a comprehensive potential failure mode analysis and risk assessment is being performed and will be included in the ongoing USACE Dam Safety Modification Report (DSMR). This report is scheduled for completion/approval in 2014.

Prior to the 2008 LORS, Lake Okeechobee operated under the Water Supply and Environmental Regulation Schedule (WSE). The 2006-2008 LORS study was initiated because of adverse environmental impacts that WSE had on the lake ecology. Dam safety was later added as a performance criterion since lowering of the lake, as the LORS study was pursuing, is one of the basic Interim Risk Reduction Measures implemented for deficient dams until appropriate remediation is effectuated. The WSE held Lake Okeechobee stages approximately 1.0 – 1.5 feet higher than the 2008 LORS under wet conditions. Studies for the remediation of HHD are based on the WSE, which was used as the basis for the development of the Standard Project Flood (SPF). The SPF is the design condition used for the remediation to address internal erosion failure modes.

FEB Located in the EAA

Consistent with CEPP modeling assumptions for the action alternatives, operational stages for the EAA FEB storage feature were typically managed between 1 and 3 feet depth, with no additional structural inflows from Lake Okeechobee allowed when the FEB depth exceeded 3.8 feet. Structural inflows to the FEB would be discontinued when depths exceed 4 feet, although additional rainfall may further increase stages. Hydraulic design of the FEB perimeter levee system included consideration of the stage variability for FEB operations. Within the RSM-BN modeling conducted to support the CEPP preliminary screening and alternative evaluations, the SFWMD Restoration Strategies FEB located on the EAA A-1 parcel and the CEPP FEB on the EAA A-2 parcel are represented as a single storage feature.

Detailed CEPP assessments within the EAA are not available because the RSM-BN does not simulate groundwater within the EAA. Further assessment of potential effects from the A-2 FEB will be deferred to the preconstruction engineering and design phase (PED). Information regarding the FEB design considerations for flood protection is included in Section B.3.2.2.

WCA 3A and WCA 3B

The USACE Final ERTP EIS and Record of Decision (ROD signed on 19 October 2012) identified the 1960 WCA 3A 9.5 to 10.5 feet, NGVD Regulation Schedule as an interim measure water management criterion for WCA 3A Zone A. This change to Zone A, compared to the previous IOP for WCA 3A regulation, was

necessary to mitigate for the observed effects, including discharge limitations of the S-12 spillways. Based upon the interim water management criteria for WCA 3A as well as the current condition of endangered species within WCA 3A, the ERTP EIS concluded that IOP is no longer a viable option for water management within WCA 3A and SDCS. The preliminary USACE Water Resources Engineering Branch (EN-W) analysis of WCA 3A high water levels, which was integrated into the ERTP EIS, also recommended further consideration of additional opportunities to reduce the duration and frequency of Water Conservation Area 3A high water events (ERTP Final EIS, Appendix A-5).

The information on which the USACE relied on to require the ERTP WCA 3A Zone A as an interim risk reduction measure for WCA 3A high water levels did not change prior to CEPP formulation, and no new information was available compared to the July 2010 assessment included as Appendix A-5 of the ERTP Final EIS. Throughout CEPP formulation, the USACE advocated that CEPP formulation efforts attempt to maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the CEPP Future Without Project (FWO) condition used during formulation, which includes ERTP, given recognition of the WCA 3A high water concerns identified with ERTP; prior to CEPP formulation, the USACE explicitly recognized that the ERTP constraint precluded raising of the top of the WCA 3A Regulation Schedule, while simultaneously recognizing that substantial benefits were still expected and that goals to further lower stages in WCA 3A were consistent with the constraint. The WCA 3A analysis provided in Section 3.2 provides comparisons between the final updated future without project baseline developed for CEPP (IORBL1) and the with-project condition (Alt 4R2); comparisons to the existing condition baseline (ECB and/or EC2012) are not provided since these comparisons were not utilized by USACE EN-W, as the ECB used during CEPP formulation included the IOP operations that were identified during ERTP as being no longer viable for water management within WCA 3A. EN-W also indicated that it would continue to rely on the WCA 3A three-gauge average stages for assessment of WCA 3A high water frequency, durations, and peak stages, consistent with the original WCA 3A design assumptions and the ERTP assessment (average of stages at the monitoring gages of 3A-3, 3A-4, and 3A-27); increased weight would not be considered for a single gage, such as 3A-28 (Site 65). It was further noted that if CEPP can provide operational assurances of additional WCA 3A outlet capacity under high water conditions, including adequate consideration of potential WCA 3B seepage management and/or ecological operational limitations, the EN-W may be able to further consider proportional relaxation of the WCA 3A future without project high water duration and frequency targets.

Agricultural and Urban Areas Located East of the East Coast Protective Levees

Flood protection in Miami-Dade County is of special concern due to the proximity of agricultural land uses, urban areas, and the Everglades. A complex network of canals, structures, culverts, impoundments, and pumps work in tandem to minimize seepage losses from the Everglades yet meet water supply and flood protection needs of agricultural and urban users, selected gauges, groundwater difference maps, seepage from regional system and other model results were evaluated collectively to determine if the level of service for flood protection was affected.

For the agricultural and urban areas located east of the East Coast Protective Levees (L-31N and L-31W), the RSM-GL has no capability to precisely measure flood control on individual fields or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to indicate a potential change in flood risk. Using the 1983 to 1993 stage duration curve data, the percentage of time the stage is above the root zone can be calculated and the information can be used to give an indication that additional flood control evaluation in the vicinity of a particular RSM-GL cell(s) may be a needed. Six gauges or cells were evaluated consistent with Restoration Coordination and Verification (RECOVER) performance measure

(**Figure B-2**). In addition, a gauge near Tamiami Trail, G-3439, was also evaluated. It is located near the neighborhoods called Belen, Sweetwater, Serena Lakes and Country Walk which have experienced flood conditions historically (**Figure B-3**). The most important part of the stage duration curve for flood protection assessment is the range of higher stages. Therefore, exceedances were evaluated for wet periods. Specifically, frequency and magnitude evaluations are made at the highest 1 to 20 percentiles of the curve, and relative magnitude of difference evaluations are made at the 10 percent frequency of stage duration. An alternative is of concern when the stages are noticeably higher than the 1983-1993 curve and when the higher stages occur for longer periods of time. Differences occurring deeper than 2 feet below land surface elevation are disregarded. It should be noted that usefulness of the 1983-1993 calibration data used in the official RECOVER performance measure was determined based on the South Florida Water Management Model (SFWMM). Confirmation that the RSM's calibration data bodes similar results (the RSM-GL calibration period is 1982-1995) or can be applied in the same manner as SFWMM has not been completed. A more appropriate comparison is the 2012EC and IORBL1 baselines in the SDCS, which include the same water control plan for this part of the system, ERTP.

The stage duration curves for the LEC canals adjacent to WCA 3B and ENP and selected monitoring gauges throughout the LEC were also assessed as part of the Savings Clause flood protection evaluation. The stage duration curves for these canals and gauges were assessed for increased stages within the upper 10 percentile, which were assumed as a representative indicator of potential increased flood protection risk.

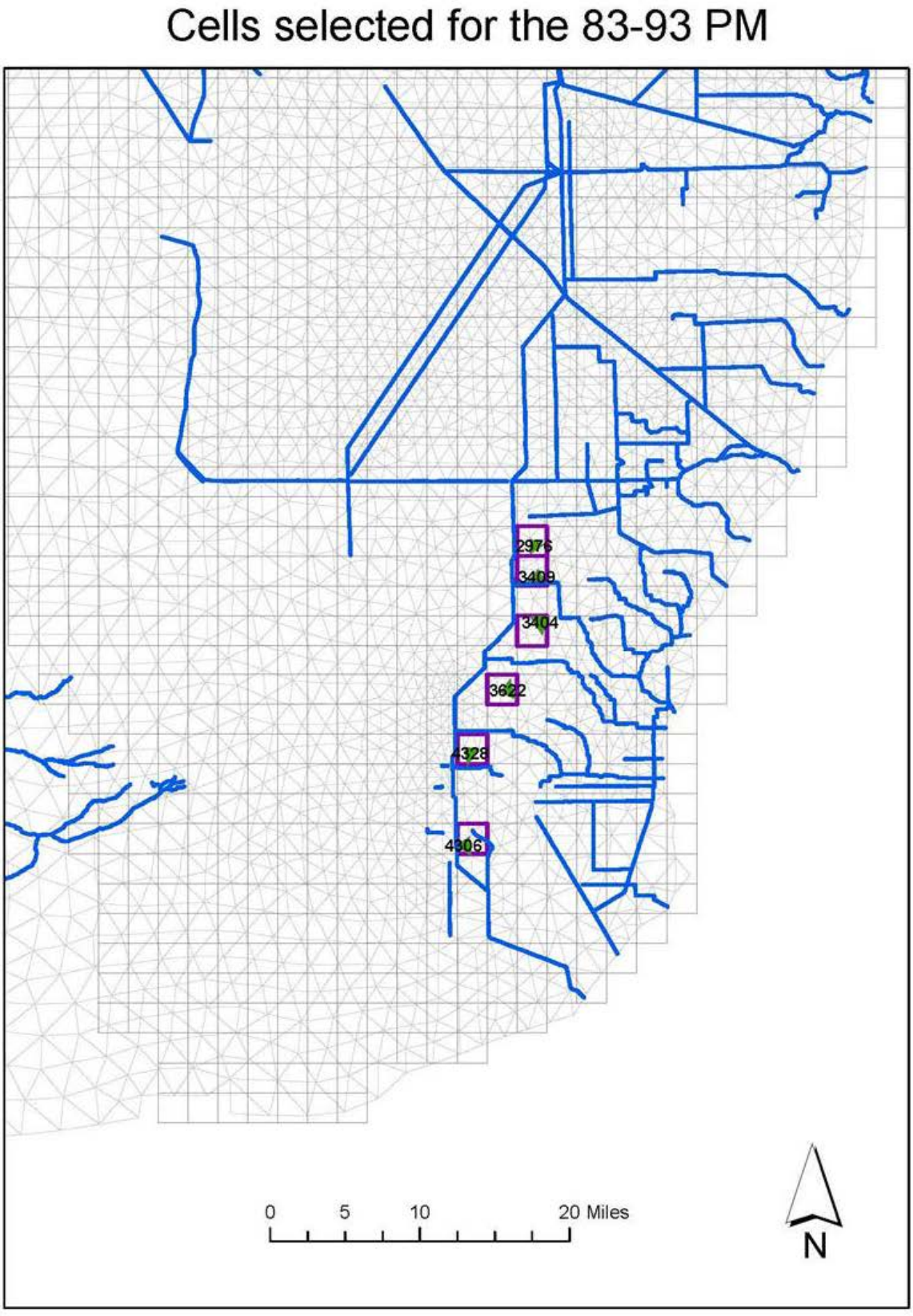

Figure B-2. Location of Cells Evaluation for Potential Effects to Agriculture in South Miami-Dade County

Figure B-3. Location of G-3439 (red dot) Relative to the Neighborhoods

B.2.3 Analyses for Project Assurances – Identifying Water Made Available by the Project for the Natural System and Other Water Related Needs

Identification of water for the natural system is based on the concept of water needed to achieve the benefits of the project and the overarching objective of restoration, preservation, and protection of the South Florida Ecosystem. The water made available for the natural system is the water required for the protection of fish and wildlife, including water that contributes to meeting hydrologic, water quality, and ecologic targets for restoration of natural systems. Hydrologic targets for the natural system applied during plan formulation help to identify water required to meet restoration objectives, in contrast to water that exceeds the targets and may be harmful or otherwise not contribute to meeting the restoration targets.

Water for project assurances is quantified where project benefits accrue, consistent with the habitat unit benefits quantified during CEPP plan formulation resultant from water being made available by the project. Water supplies for other water-related needs were identified during the CEPP plan formulation process, as well. The basins where the project potentially supplies water for the natural system or other water-related needs are listed below:

- Natural System
  - Everglades
    - WCA 3
    - ENP including Florida Bay
- Other Water-Related Needs
    - LOSA including EAA
    - LECSA-2
    - LECSA-3

Identification of the water made available by the CEPP project requires additional analyses of the RSM-BN and RSM-GL results for the TSP Alternative 4R2. The identification of water involves both 1) existing water in the system at the time of PIR development that is available to the natural system and available for other water-related needs, and 2) water made available by the project to the natural system and for other water-related needs, as depicted in **Figure B-4**. The sum of these two categories is the total water that is expected to be available to the natural system and available for other water-related needs.

For CEPP, both categories of the water can be quantified by calculating the flows in the regional system. The existing water supply in the C&SF Project system includes previously identified or reserved water associated with other CERP projects. For this analysis, the Caloosahatchee River (C-43) West Basin Reservoir, Indian River Lagoon-South C-44 Reservoir, Site 1 (Fran Reich) Reservoir, Broward County Water Preserve Areas, Biscayne Bay Coastal Wetlands (not included in the RSM-GL model), and C-111 Western Spreader Canal were included in the without project initial operating regime (IORBL1). The total water made available by the project is represented by the with project condition. For CEPP, the with project condition is equivalent to the Alt 4R2 model run. The difference between these two conditions represents the water made available by the project (Alt 4R2 minus IORBL1) as depicted in **Table B-5.**

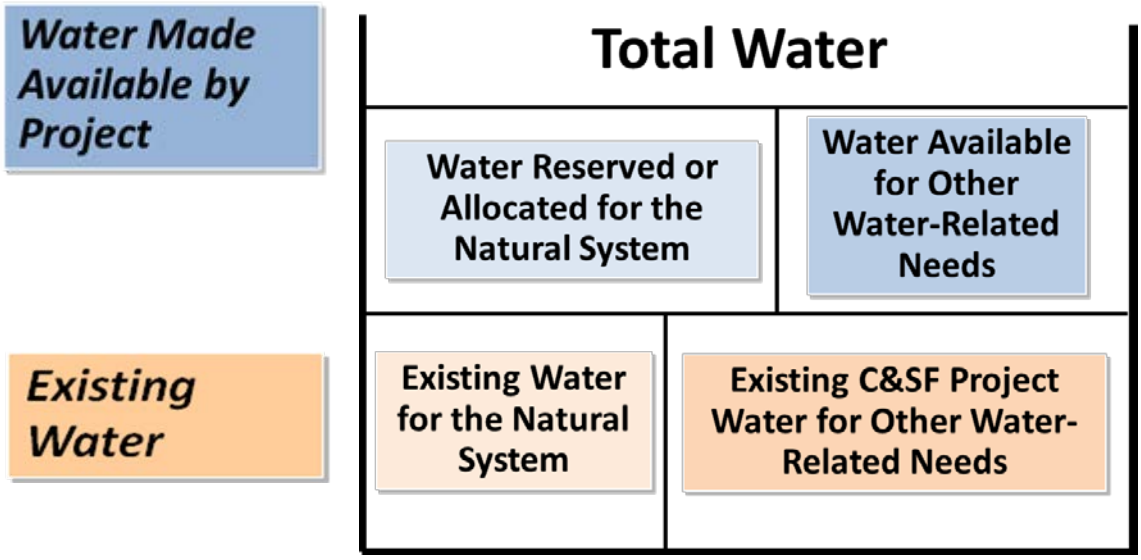

Figure B-4. Water Needed to Achieve the Benefits of the Plan

Table B-5. Summary of Analyses for the Identification of Water Made Available by the Project

Analysis	Water for the Natural System
Existing pre-project water for the natural system	IORBL1
Total water for the natural system	ALT 4R2
Identification of water made available by the project	I Difference between ALT 4R2 and IORBL1

To follow the habitat unit benefits calculated during plan formulation, three spatial locations were selected to quantify the water needed to achieve the benefits of the CEPP recommended plan: inflows to WCA 3 (along the formulation redline), inflows to ENP, and overland flows to Florida Bay. Surface water inflows along the redline to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the ECB, 2012EC, and IORBL1 base conditions; for Alternative 4R2, the combined flows from the S-8 pump station discharges to the Miami Canal and discharges to the S-8A gated culvert (which diverts water to the L-4 Levee degrade gap) are included in addition to S-150 and STA-5/STA-6 outflows to WCA 3A. Inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G; Alternative 4R2 only) and S-356 (Alternative 4R2 only). Overland flows to Florida Bay are quantified for RSM-GL Transect 23 (southeast ENP) and Transect 27 (Central Shark River Slough). Quantification of water made available for the natural system is displayed using volume probability curves. The 10th, 50th, and 90th percentiles will be identified for the Alt 4R2 and the IORBL1. The difference between these conditions is the water made available by the CEPP project for the natural system. CEPP benefits projected for the Northern Estuaries are the result of reduced discharges from Lake Okeechobee, and therefore do not require additional water to be reserved for the natural system.

To evaluate whether additional water is made available by the project to meet other water related needs, specifically water supply in LOSA, the improvements to the level of service were evaluated. For the LECSAs, whether additional water has been made available by the project in the regional system is quantified as the increase in demand above the pre-project public water supplies (IORBL1) in LECSA-2 and LECSA-3 that could be met without affecting the benefits accrued to the natural system. The increase in demand is included in the with project condition, Alt 4R2.

B.3 Results

B.3.1 Elimination or Transfer of Existing Legal Sources

B.3.1.1 Lake Okeechobee Service Area

Due to the reduction in irrigated land with the inclusion of the FEB on the EAA A-2 site, the demand for supplemental irrigation is reduced from an annual average of 339 thousand acre-feet (kAF) in the future without project condition (IORBL1) to 328 kAF in Alt 4R2.

Consistent with the WRDA 2000 and the Programmatic Regulations, the savings clause analysis removes the effects of the intervening non-CERP projects. The volume of demand not met for the LOSA during the eight years with the largest water shortage cutbacks in the period of simulation is the same or slightly improved when comparing the with project condition, Alt 4R2, and the without project condition, IORBL1. In six of these years, the volume of demand not met is reduced (improved water supply performance) by approximately one to seven percent. In the two remaining years where the

volume of demand not met increases compared to the without project condition (1981 and 1982), the increase is one percent or less (**Figure B-5**). Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 6 kAF (1%) in the with project condition compared to the without-project condition (Alt 4R2 and IORBL1 average 29 kAF and 35 kAF of cutbacks for EAA and Other LOSA combined, respectively) (**Figure B-6**).

An additional analysis compares the 2012EC and ECB to Alt 4R2. The water supply demands met improve slightly. Of the eight years with the largest water shortage cutbacks, seven years indicate reduced cutbacks ranging between less than one to six percent for the with project condition (Alt 4R2), compared to the without project condition (IORBL1). In one year, 1989, the cutback percentage is increased by approximately one percent. Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 4 kAF (<1%) in the with project condition compared to the existing baselines (Alt 4R2 averages 29 kAF of cutbacks, and 2012EC/ECB average 33 kAF of cutbacks for EAA and Other LOSA combined).

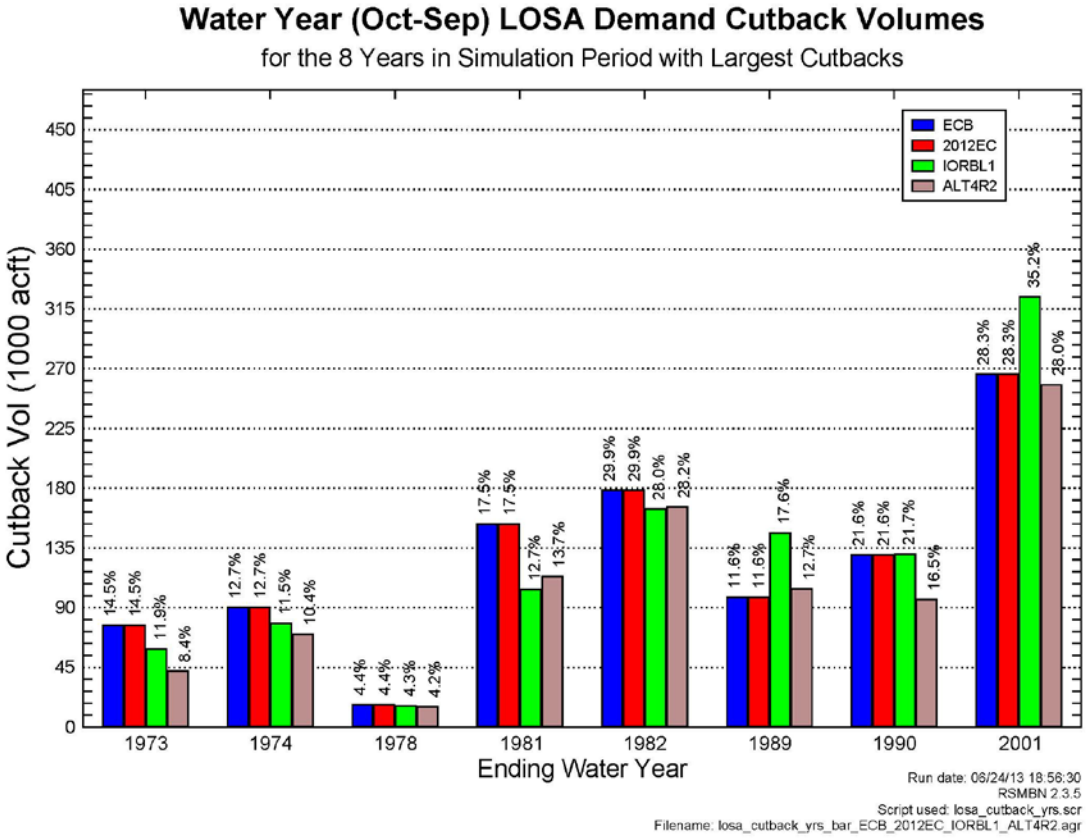

Figure B-5. LOSA Demand Cutback Volumes for the 8 Years with the Largest Cutbacks

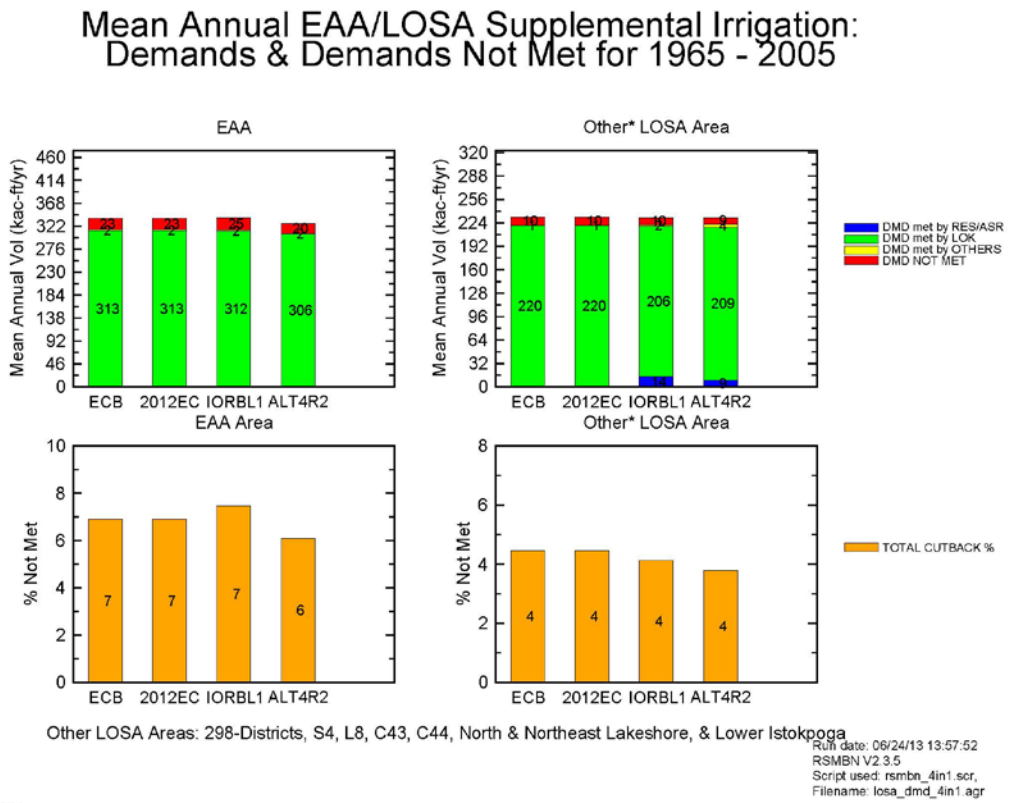

Figure B-6. Mean Annual EAA/LOSA Supplemental Irrigation: Demands & Demands Not Met for 1965–2005

B.3.1.2 Transfer of Existing Legal Users Water Supply Source

Included in the future without (IORBL1) and CEPP Alt 4R2 operations is utilization of the IRL-S project C-44 Reservoir to backflow water to Lake Okeechobee when stages in the C-44 Canal permit. Typically water is backflowed when stages in Lake Okeechobee fall below the Baseflow sub-band as identified in LORS 2008. The operations of the CEPP Alt 4R2 expand on this concept to backflow water captured in the C-44 Reservoir including water conveyed from the C-23 Canal and Basin. The additional volume of water backflowed from the C-44 Reservoir averages 21.3 kAF on an annual basis, the difference between Alt 4R2 and IORBL1 (37.6 kAF and 16.3 kAF, respectively). Although Lake Okeechobee would continue to be the source of water for agricultural users within LOSA, this operational change is considered a partial water supply source transfer since the C-44 Reservoir does not contribute to Lake inflows in the IORBL1.

B.3.1.3 Lower East Coast Service Area

Existing legal sources of water in the LECSA include groundwater withdrawn by public utility wellfields, private wells, agricultural irrigation wells, and surface water withdrawals for agricultural uses in the LECSA 2 and LECSA 3. The Seminole Indian Tribe also withdrawals groundwater to meet water supply demands in LECSA 2. CEPP Alt 4R2 project features and operations are designed to maintain canal and groundwater stages, manage additional seepage quantities, and maintain overall flows to the LECSAs and Biscayne Bay. The water the CEPP project provides to WCA 3A will meet State water quality standards as required by Section 385.53(b)(3)(i) of the Programmatic Regulations. This additional water

will flow south to ENP and some portion will reach the LECSA through recharge of the surficial aquifer system.

In the LECSA, the water supply demand continues to be met by the regional system including Lake Okeechobee, the WCAs, and the surficial aquifer system. The ability to continue to meet urban and agricultural demands with CEPP implementation is evaluated by assessing relative changes in the frequency of water supply cutbacks in LECSA 2 and LECSA 3. Although the RSM-GL model predictions of the absolute number of water supply cutback events and the corresponding frequency of occurrence have a high degree of uncertainty, relative comparisons between the RSM-GL base conditions and the RSM-GL with project condition (Alt 4R2) provide a meaningful comparison to quantify potential effects of the CEPP project. Water supply cutbacks to the LECSAs can be triggered by Lake Okeechobee stages or by local groundwater levels. If the local groundwater levels trigger increased water shortage cutbacks, the trigger may either be the result of changed local groundwater conditions resulting directly from the CEPP project or more locally triggered cutback events becoming apparent as the lake triggered cutback events decline in frequency with the moderate to significant increase to Lake Okeechobee stages with Alt 4R2. In the case of the CEPP, increased LECSA water shortage cutbacks triggered by local groundwater stages are the result of the increased stages in Lake Okeechobee.

In the with project condition (Alt 4R2), the number of water years with lake triggered cutbacks during the period of simulation is 13 events and local groundwater triggered cutbacks is 19 events in LECSA 2. For the future without condition (IORBL1), the number of water years with lake triggered cutbacks is 16 events and groundwater triggered cutbacks is 16 events in LECSA 2. The total number of cutbacks events and the resulting frequency for LECSA 2 remains the same for the two conditions at 32 events (**Figure B-7** and **Figure B-8**). For LECSA 3, there are no locally triggered groundwater cutbacks events indicated in the Alt 4R2 or IORBL1 modeling simulations. The number and frequency of water years with cutback events declines since the lake triggered cutback events decline from 16 with the IORBL1 to 13 with Alt 4R2 due to the rise in lake stages with the inclusion of the project (**Figure B-9** and **Figure B-10**). CEPP implementation will provide increased stages and extended hydroperiods within WCA 3B and NESRS, resulting in a net increase in average annual groundwater seepage flows from these natural areas to the adjacent LECSA 3. The increased seepage flows may slightly alter the water quality composition within the LECSA 3 surficial aquifer, through the relative increased contribution of groundwater seepage flows to the surficial aquifer recharge compared to the contribution from regional C&SF canal flows. These changes should result in either no significant change or a potential minor improvement to the water quality of withdrawals from the proximate public water supply wellfields within LECSA 3.

Comparisons to the existing condition base conditions (2012EC and ECB) indicate one additional water year cutback event with the existing condition compared to Alt 4R2 in LECSA2 (33 cutback events compared to 32 events). For LECSA 3, there are no locally triggered groundwater cutbacks events. The total number and frequency of lake triggered cutback events are the same for Alt 4R2 and the 2012EC/ECB, at 13 events (**Figure B-11** through **Figure B-14**).

Comparison of the regional groundwater stage difference map comparing Alt 4R2 and the IORBL1 identify where systemic reductions may occur. The April 1989 map was selected to determine whether the CEPP project affects groundwater levels during a specific dry year condition where regional water levels are most likely to be impacted. April is typically the driest month of the year and 1989 was one of severest droughts within the period of simulation. For the comparison of Alt 4R2 and the IORBL1, the average April 1989 regional water levels were maintained in LECSA 2 and improved (higher levels) in LECSA3 (**Figure B-15**).

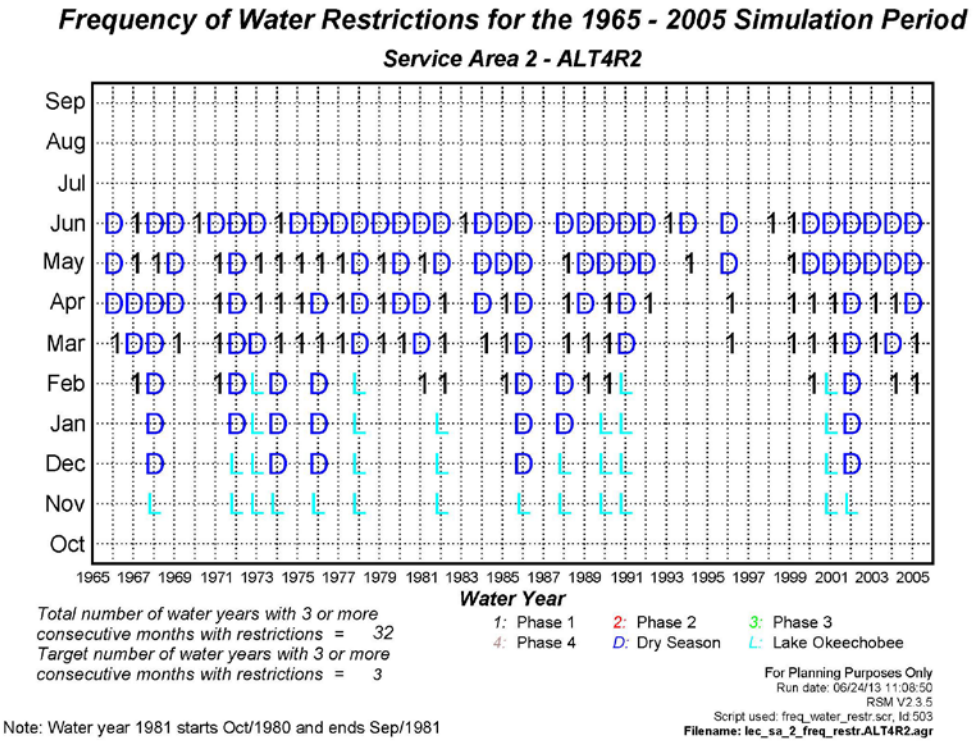

Figure B-7. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 Alt 4R2 Scenario

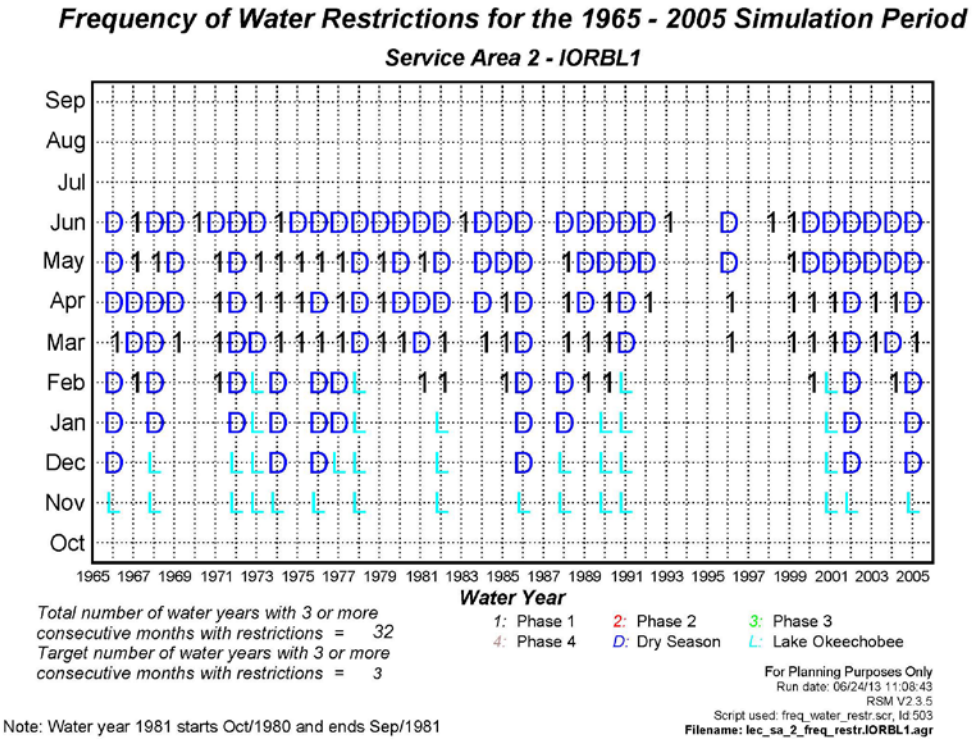

Figure B-8. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 IORBL1 Scenario

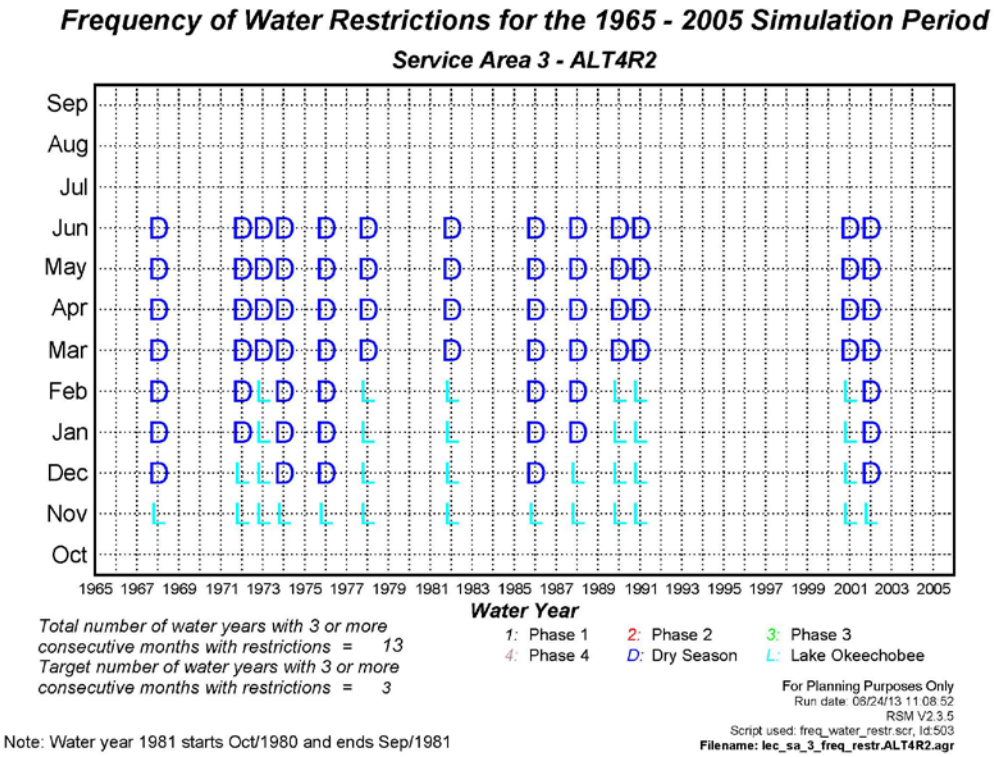

Figure B-9. Frequency of Water Restrictions for the 1965-2005 Simulation Period for the LECSA 3 Alt 4R2 Scenario

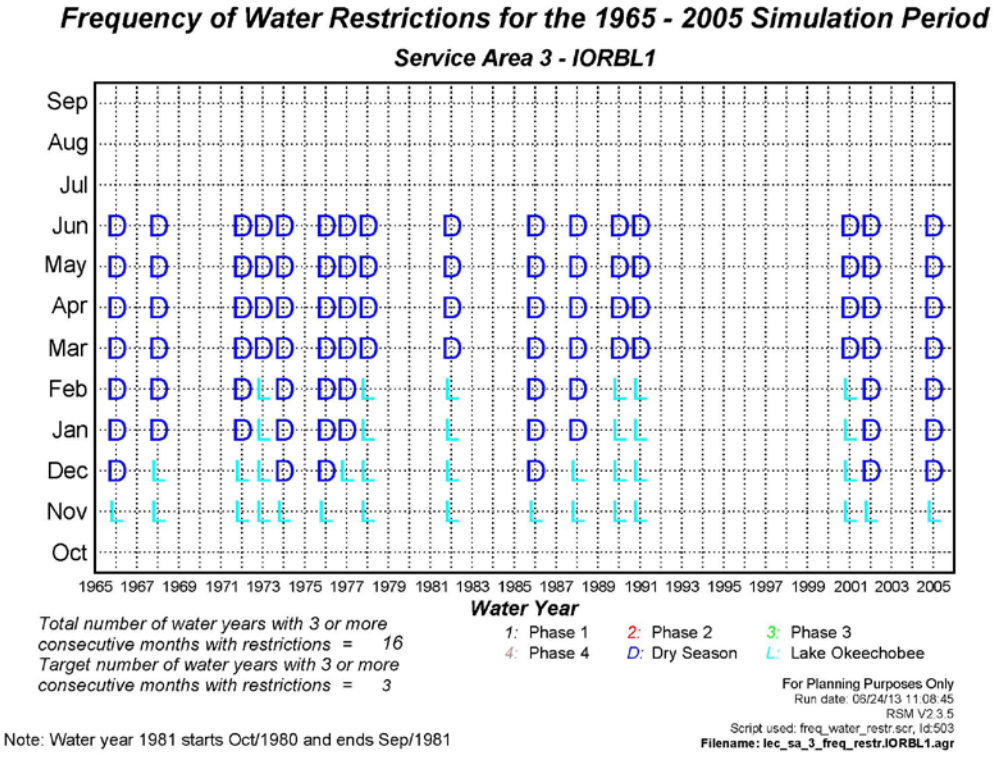

Figure B-10. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 IORBL1 Scenario

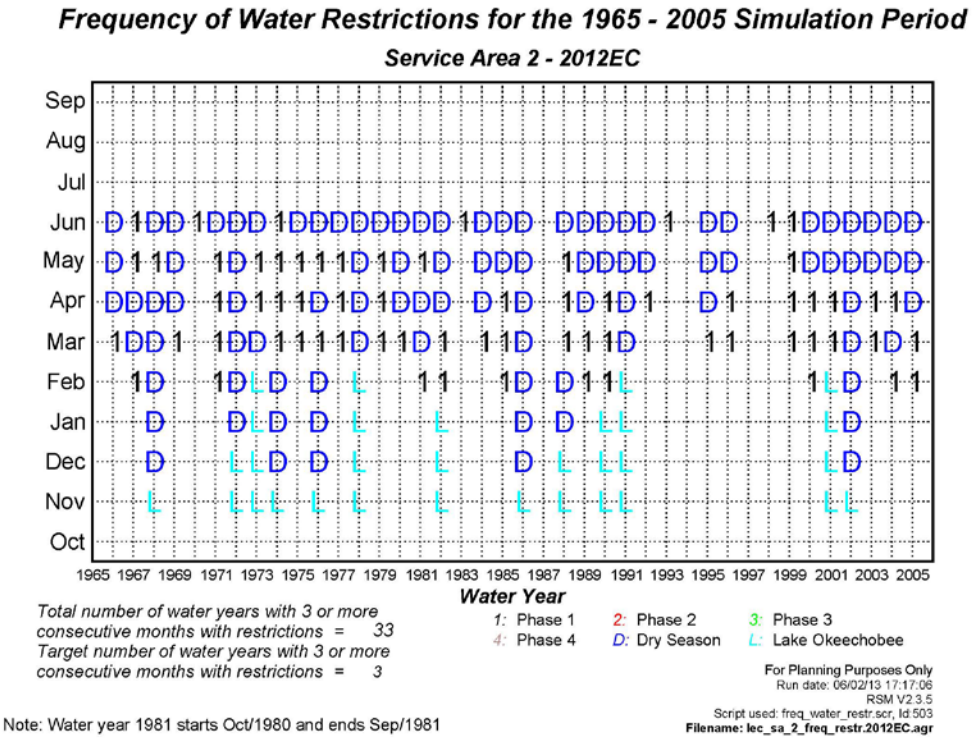

Figure B-11. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 2012EC Scenario

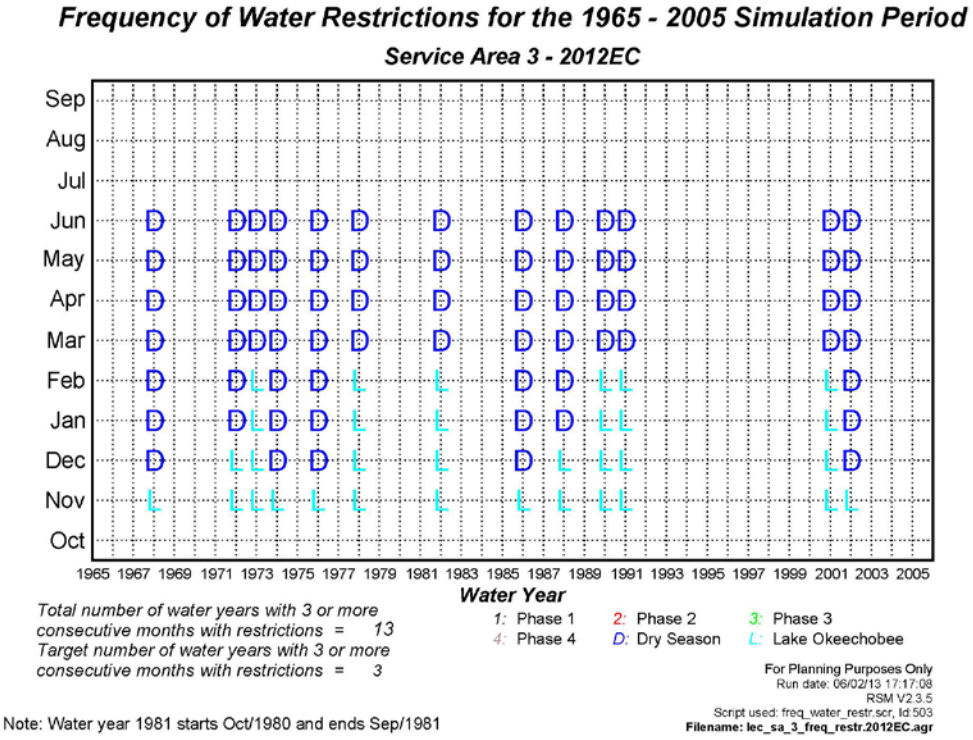

Figure B-12. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 2012EC Scenario

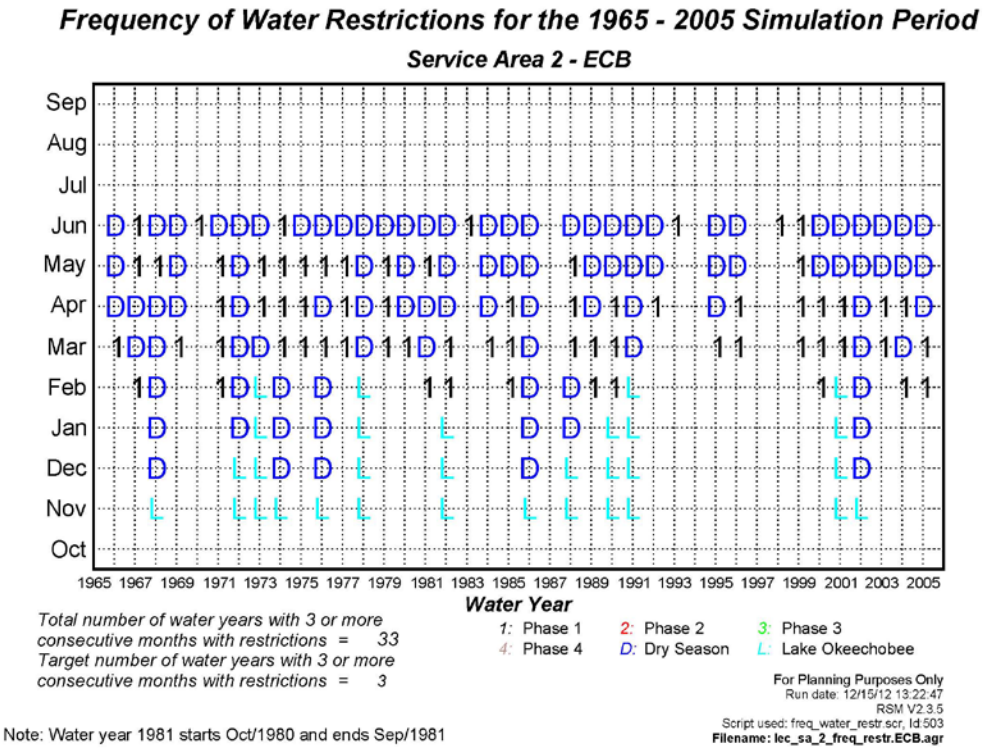

Figure B-13. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 ECB Scenario

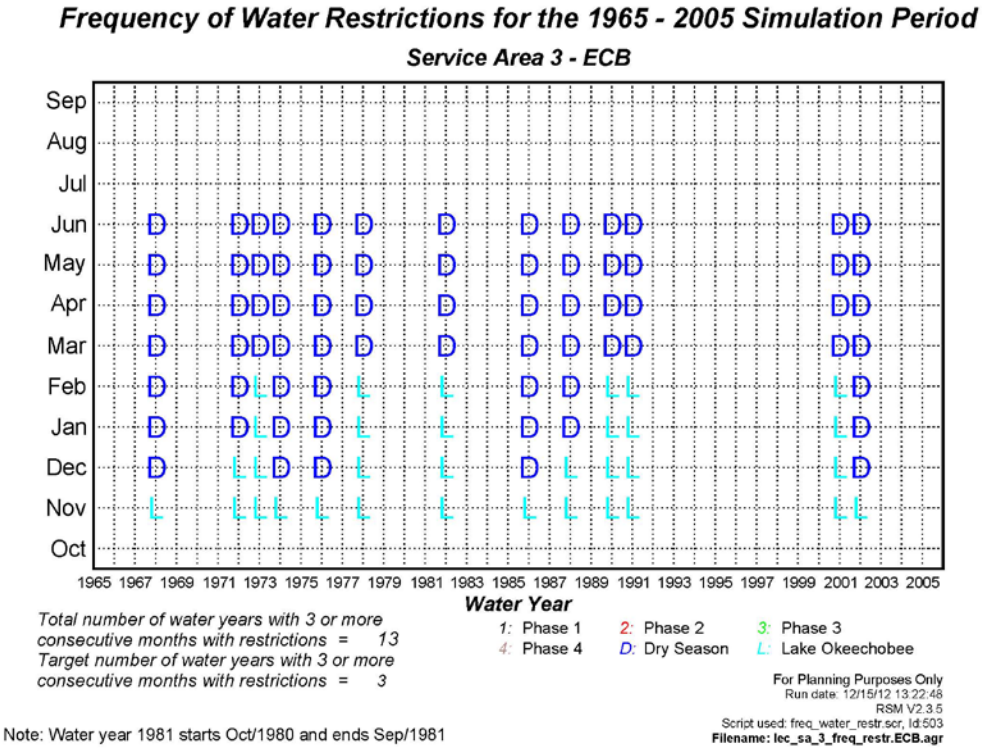

Figure B-14. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 ECB Scenario

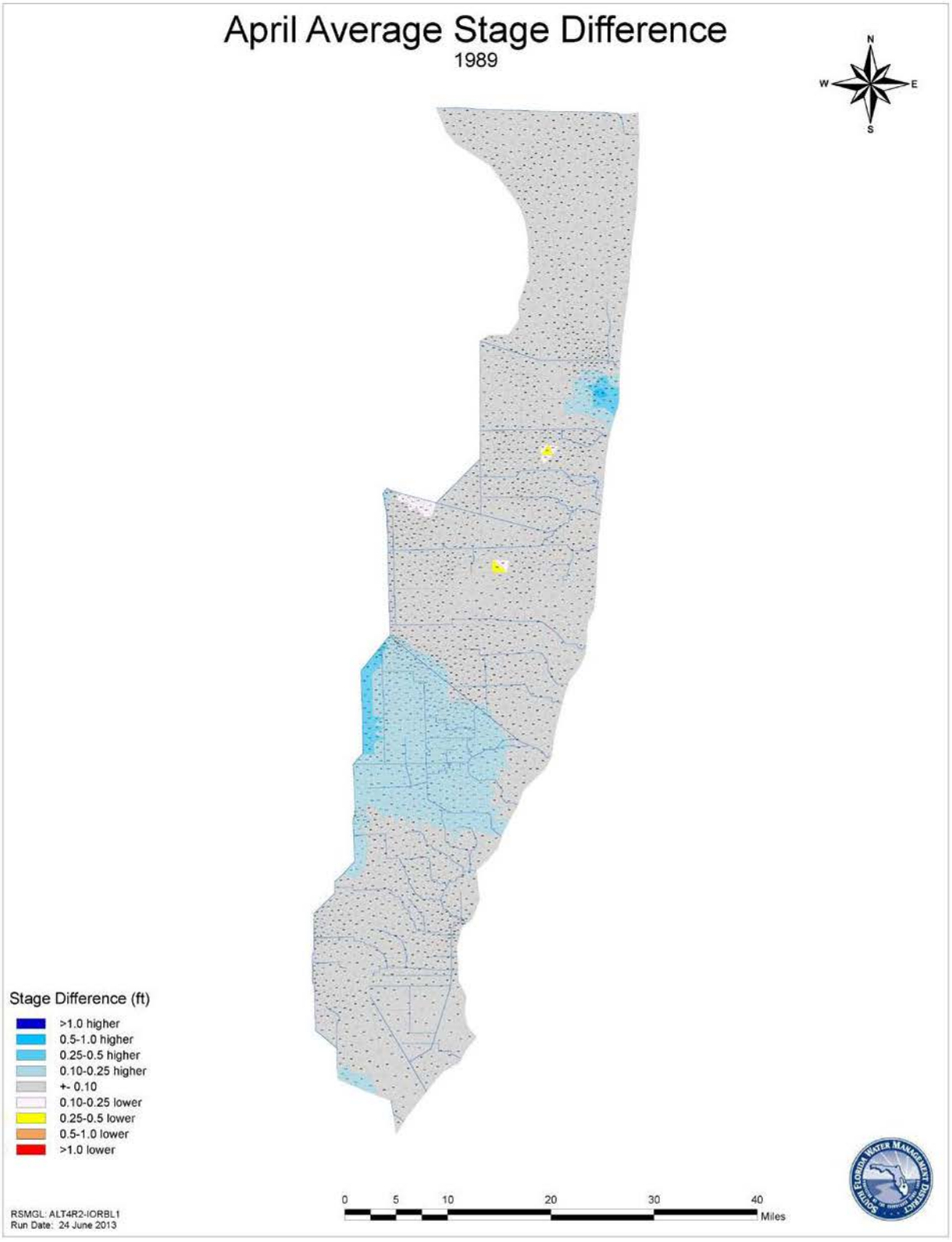

Figure B-15. Difference between groundwater stages for Alt 4R2 and IORBL1 for April 1989

B.3.1.4 Ability to Delivery Water to LECSA with Miami Canal Backfilled

CEPP Alt 4R2 proposed to backfill the Miami Canal in WCA 3 from one to two miles south of the S-8 pump station to just north of I-75. Water supply deliveries previously made through the Miami Canal would be rerouted through the North New River (NNR) Canal (**Figure B-16**). Since 2003, this eastern route has been preferentially utilized by the SFWMD for water supply deliveries due to its proximity to Stormwater Treatment Area (STA) 3/4.

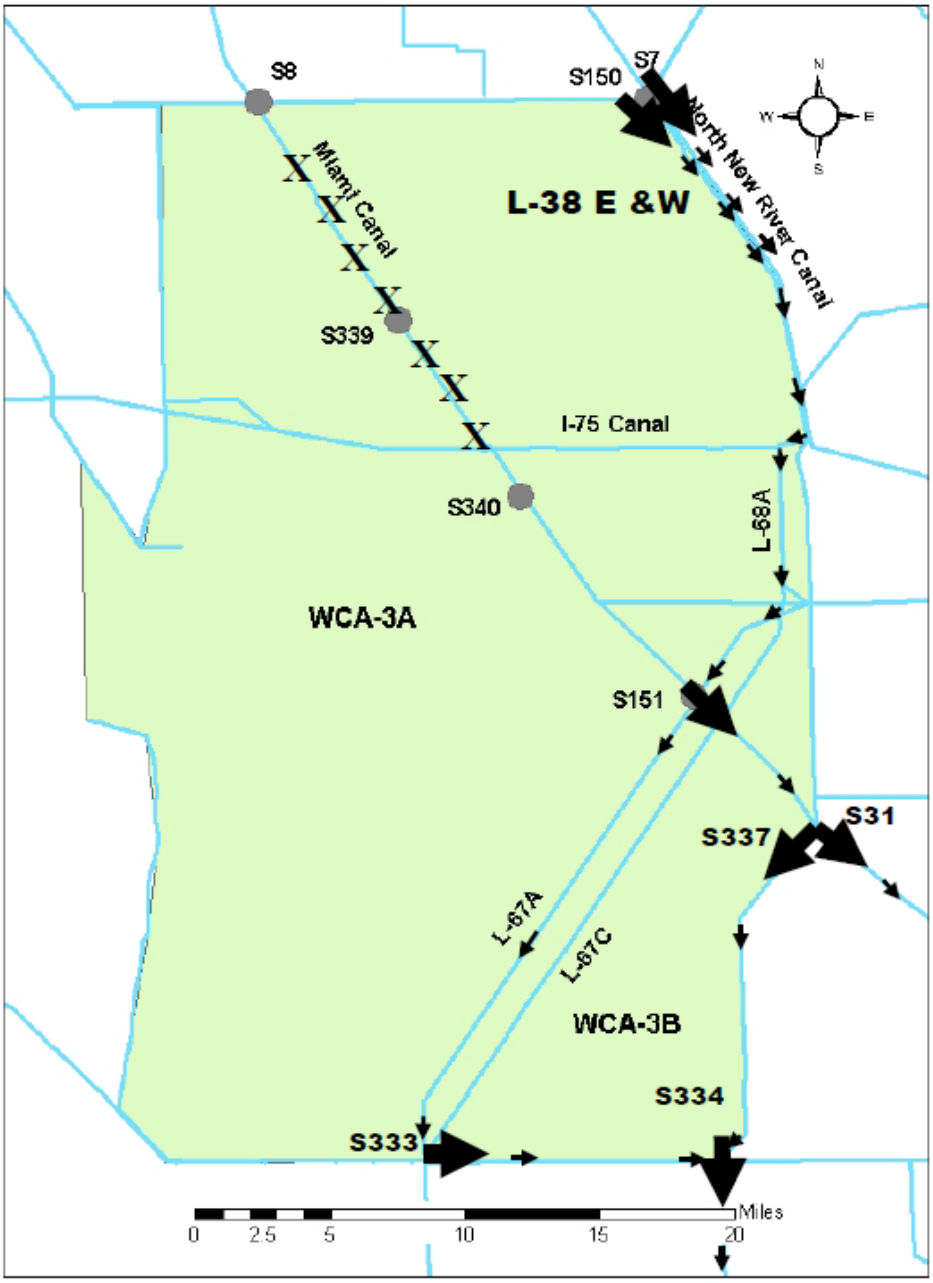

Figure B-16. Water Delivery Route with Miami Canal Filled in WCA 3A

Based on SFWMD's existing operation rules for water delivery to Miami Dade County, water supply deliveries to Miami-Dade County and the SDCS are made from WCA 3A at the S-333 and S-151 structures. When the water level in WCA 3A is at its floor elevation (when headwater at S-333 is at or below 7.5 feet NGVD), a corresponding volume of water is passed into the north end of WCA 3A through S-8, S-7, or S-150 facilities roughly equaling the amount of water released at S-333 or S-151. Based on SFWMD's operation rules for water delivery to LECSA 3 and the WCA 3A Regulation Schedule, water supply is delivered from WCA 3A and not from Lake Okeechobee. Therefore, the conveyance for water supply is more critical at the southern end of the system. Water is taken out of WCA3A at the southeast end and conveyed into WCA 3A at the north end. Through evaporation, rainfall, groundwater and marsh interaction with water in the channel, both quantity and quality of the water entering northern WCA 3A and discharged from southern WCA 3A are different. When WCA 3A is at or below floor elevation, water supply deliveries and corresponding recharge for WCA 3A is based on a conservation of mass approach for WCA 3A; water managers attempt to balance the water anticipated for water supply demands, evaporation and seepage with a roughly equal quantity input into WCA 3A from Lake Okeechobee or the EAA, depending on availability.

Under the CEPP Alt 4R2, the southern one-third of the L-67A/L-67C levees and adjacent borrow canals are proposed to be modified to provide inflows to WCA 3B within the proposed Blue Shanty flowway, and a new spillway divide structure is proposed along the eastern L-29 Canal to allow flexibility for environmental deliveries to Everglades National Park (ENP) across the Tamiami Trail, both east and west of the divide structure. These environmental deliveries may conflict with water supply deliveries to SDCS so the alternate route through structures S-151, S-337 and down the L-30 borrow canal will continue to provide a path for deliveries to the SDCS.

The system-wide conditions have changed considerably since 2000 and these changes to the water supply delivery approach represent intervening non-CERP activities. The original Pre-CERP Baseline, which was developed to represent conditions in place at the time of WRDA 2000 (December 2000), does not include the intervening non-CERP activities and does not reflect revised circumstances under which the project has been formulated and may be implemented. Since 2000, the regional water delivery system has undergone significant changes in operations due to a number of regional and local factors, including implementation of regional operational changes with IOP (2002), ERTP (2012), and the 2008 LORS (2008).

For the CERP WCA 3A Decompartmentalization project (Decomp), the USACE and SFWMD completed an analysis examining the sum of flow at S-7, S-150 and S-8 in cubic feet per second (cfs) over the period from January 1, 1999 to December 31, 2008 (**Figure B-17** and **Table B-6**). Consistent with the operating criteria used to establish water supply delivery mode to LECSA 3, the data was been filtered to show only values when the S-12 structures are not open and there is flow at S-334 or S-337. The periods shown are also consistent with periods when headwater stages at SDCS structures S-176 , S-177 and S-18C would indicate a demand for water (stage less than or equal to 4.0, 3.0 and 2.0 ft NGVD, respectively). Between 1999 and 2008, nine periods were identified when flow at S-7, S-150 and S-8 occurred at the same time as flows from S-334 and/or S-337. For the majority of the days when these conditions were met, the sum of flow at S-7, S-150 and S-8 has been less than 600 cfs. **Figure B-17** and **Table B-6** annotate those times where the total flow exceeded 600 cfs. In all of the cases when the flow exceeded 600 cfs, the discharges resulted from flood control operations, either in response to or anticipation of wet conditions in the EAA due to a significant rainfall event or high stages in the EAA.

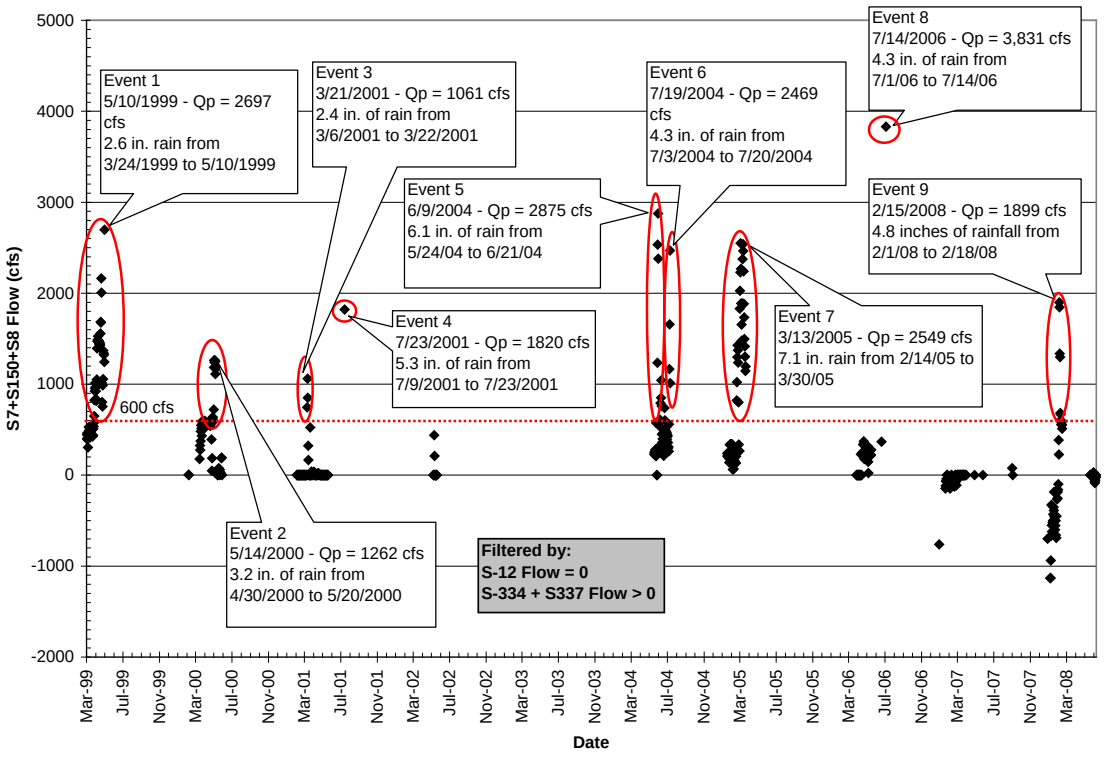

Figure B-17. Decomp Assessment of S-7, S-150, and S-8 Flows for 1999-2008

Table B-6. Summary Table of Pumping/Delivery Events greater than 600 cfs from 1999 to 2008 at S8+S7+S150

Pumping Event (Rainfall Map #)	Pumping Dates (start date to end date)		Peak Pumping Rate (cfs)	Rainfall Period (includes 2 weeks prior to pumping)		Total Rainfall in EAA basin over Rainfall Period (inches)
1	4-6-1999	5-10-1999	2697	3-24-1999	5-10-1999	2.6
2	5-13 -2000	5-20-2000	1254	4-30-2000	5-20-2000	3.2
3	3-20-2001	3-22-2001	1061	3-6-2001	3-22-2001	2.4
4*	7-23-2001	7-23-2001	1820	7-9-2001	7-23-2001	5.3
5*	6-7-2004	6-21-2004	2875	5-24-2004	6-21-2004	6.1
6*	7-17-2004	7-20-2004	2469	7-3-2004	7-20-2004	4.3
7	2-28-2005	3-30-2005	2549	2-14-2005	3-30-2005	7.1
8*	7-14-2006	7-14-2006	3831	7-1-2006	7-14-2006	4.3
9	2-15-2008	2-18-2008	1899	2-1-2008	2-18-2008	4.8

* Denotes Wet Season Event

With most of the northern portion of the Miami Canal backfilled (north of I-75) and WCA 3A below its floor elevation, the eastern water supply delivery route (**Figure B-16**) is the only conveyance route available to provide water from Lake Okeechobee to offset water supply delivery from WCA 3A. The CEPP Alt 4R2 may affect one of the two water supply delivery routes from WCA 3A to the SDCS. The route that continues down L-67A to S-333/S-334 may not always be available due to environmental delivery schedules still under development. However, the route directing water from L-67A in WCA-3A through S-151, S-337 and the L-30 Canal is always available and has sufficient capacity to deliver the pre-existing water supply delivery requirements of 600 cfs.

B.3.1.5 Seminole Tribe of Florida

Both the Brighton and Big Cypress Reservations depend partially on Lake Okeechobee for supplemental irrigation water supplies for agricultural and other needs. The unmet demand volume and percentage of water demand not met can be compared to assess the ability of existing legal sources to continue to meet demands. For the Brighton Reservation, the unmet demand volume and percentage of demand not able to be met are essentially the same in the with project condition (Alt 4R2) and the without-project condition (IORBL1). In the with project condition (Alt 4R2), the unmet demand volume and percentage of demand not able to be met are 1 kAF and 3.2 percent, respectively; for the without-project condition (IORBL1), the unmet demand volume and percentage of demand not able to be met are 1 kAF and 3.9 percent, respectively. For the Big Cypress Reservation, the unmet demand volume and percentage of demand not able to be met are essentially the same as well. In the with project condition (Alt 4R2), the unmet demand volume and percentage of demand not met are 1 kAF and 3.6 percent, respectively; for the without-project condition (IORBL1), the unmet demand volume and percentage of demand not met are 1 kAF and 3.9 percent, respectively.

For the additional evaluations, the base conditions 2012EC and ECB perform similar to the IORBL1 and therefore essentially the same as Alt 4R2. For the Brighton Reservation, the baselines, 2012EC and ECB, volume and percentage of demand not met are 1 kAF and 3.8 percent. For the Big Cypress Reservation, the baselines, 2012EC and ECB, the volume and percentage of demand not met for both conditions are 1 kAF and 4.8 percent (**Figure B-18** and **Figure B-19**).

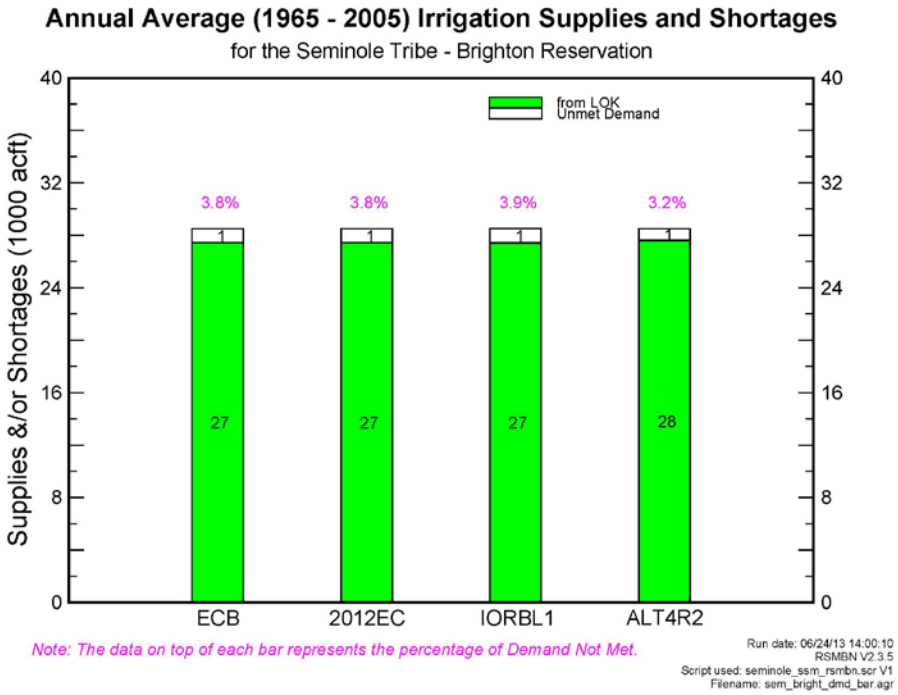

Figure B-18. Annual Average (1965–2005) Irrigation Supplies and Shortages for the Seminole Tribe – Brighton Reservation

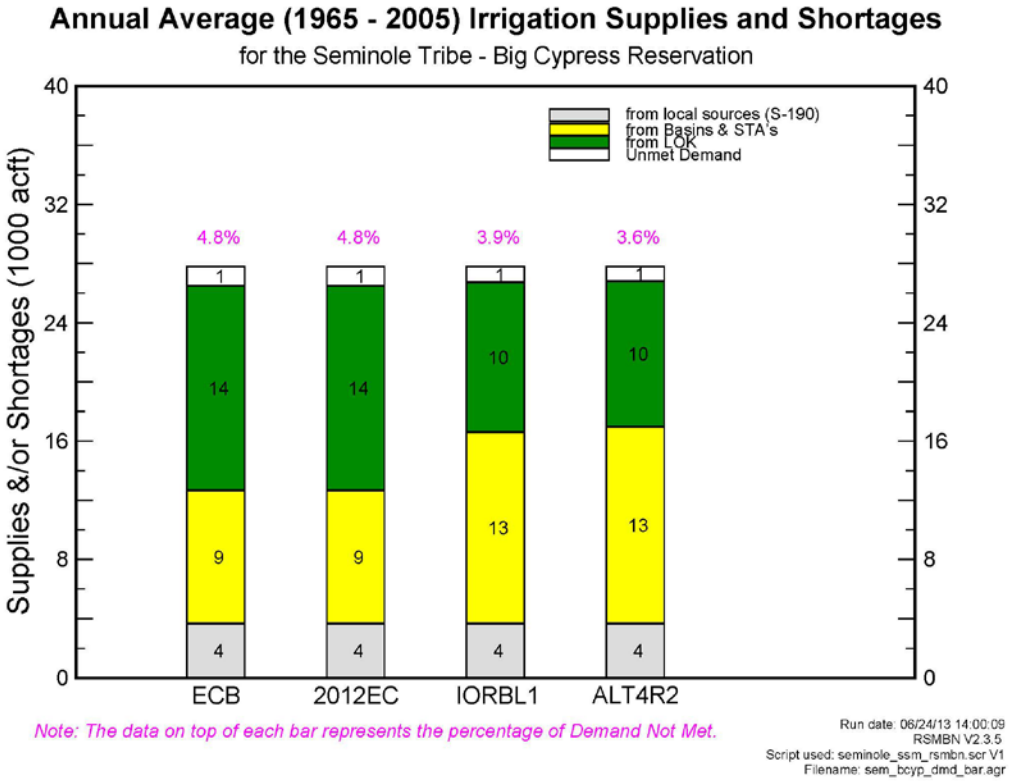

Figure B-19. Annual Average (1965–2005) Irrigation Supplies and Shortages for the Seminole Tribe – Big Cypress Reservation

B.3.1.6 Miccosukee Tribe of Indians of Florida

The Miccosukee Tribe of Indians of Florida has several reservation areas and resorts in the project area. The reservation areas utilize groundwater as their source of water. The resort, located in Miami-Dade County, utilizes potable water supplied by Miami-Dade Water and Sewer Department. These sources will not be reduced or negatively affected by CEPP.

B.3.1.7 Everglades National Park

For ENP, water deliveries at Tamiami Trail are displayed in **Figure B-20**. This is the average annual delivery volume probability curve for the 41-year period of simulation. Inflows to ENP are quantified for the S12s (A-D), S333, the S355s (A&B), S345 (F&G; Alternative 4R2 only) and S356 (Alternative 4R2 only). The with project condition, Alt 4R2, deliveries exceed the without project condition, IORBL1, for each year.

Comparisons to the existing condition baselines (2012EC and ECB) also indicate that the with project condition deliveries exceed the existing condition deliveries for each year as well.

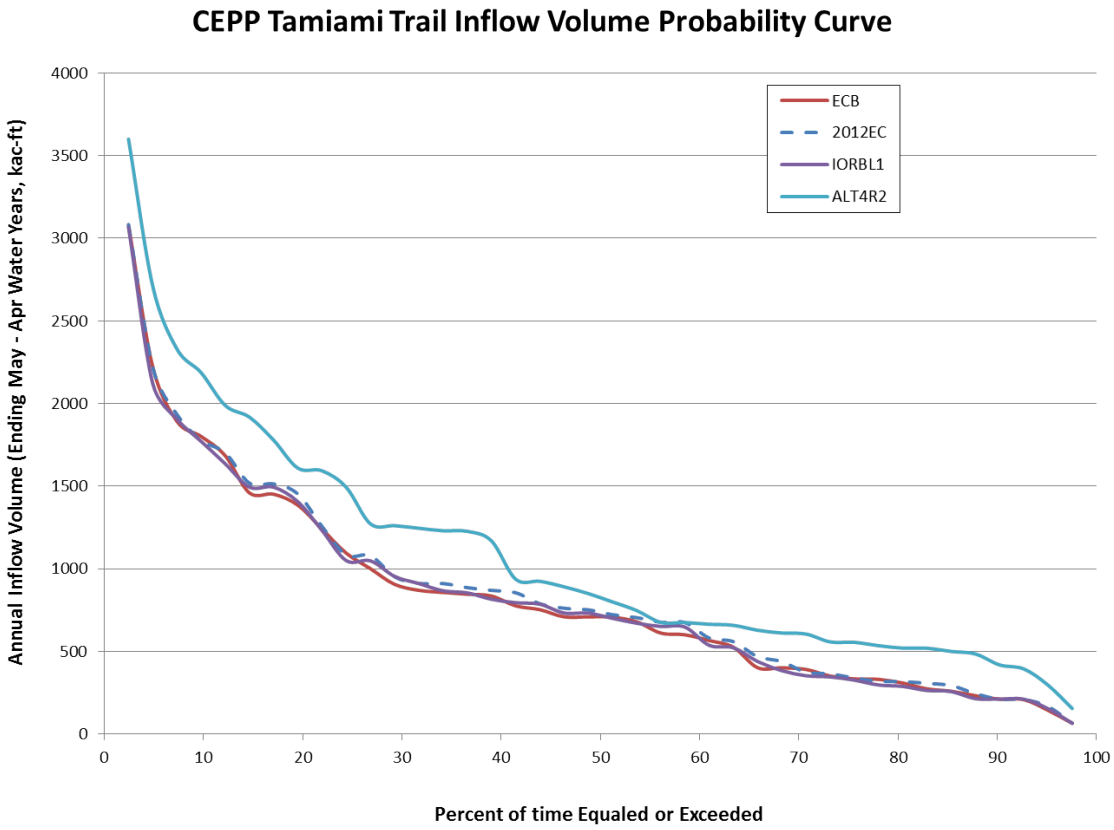

Figure B-20. CEPP Tamiami Trail Inflow Volume Probability Curve

B.3.1.8 Water Supply for Fish and Wildlife

Caloosahatchee Estuary

The low flow criteria for the Caloosahatchee Estuary is an average monthly flows of less than 450 cfs. In the Caloosahatchee Estuary, the number of months the low flow criteria is not met is similar in the with project (Alt 4R2) and without-project (IORBL1) conditions (**Figure B-21**). The estuary low flow criteria are not met for 23 months out the 41-year period of simulation (492 total months) in Alt 4R2 and 27 months in the IORBL1.

Comparisons to the existing condition baselines show significant improvement in low flow performance with Alt 4R2. Both the 2012EC and ECB show 116 months when average monthly flows are less than 450 cfs, compared to 23 months in Alt 4R2. Neither of the existing condition baselines benefit from the inclusion of the CERP Caloosahatchee River (C-43) West Basin Reservoir, which is included in the future without (IORBL1) assumptions.

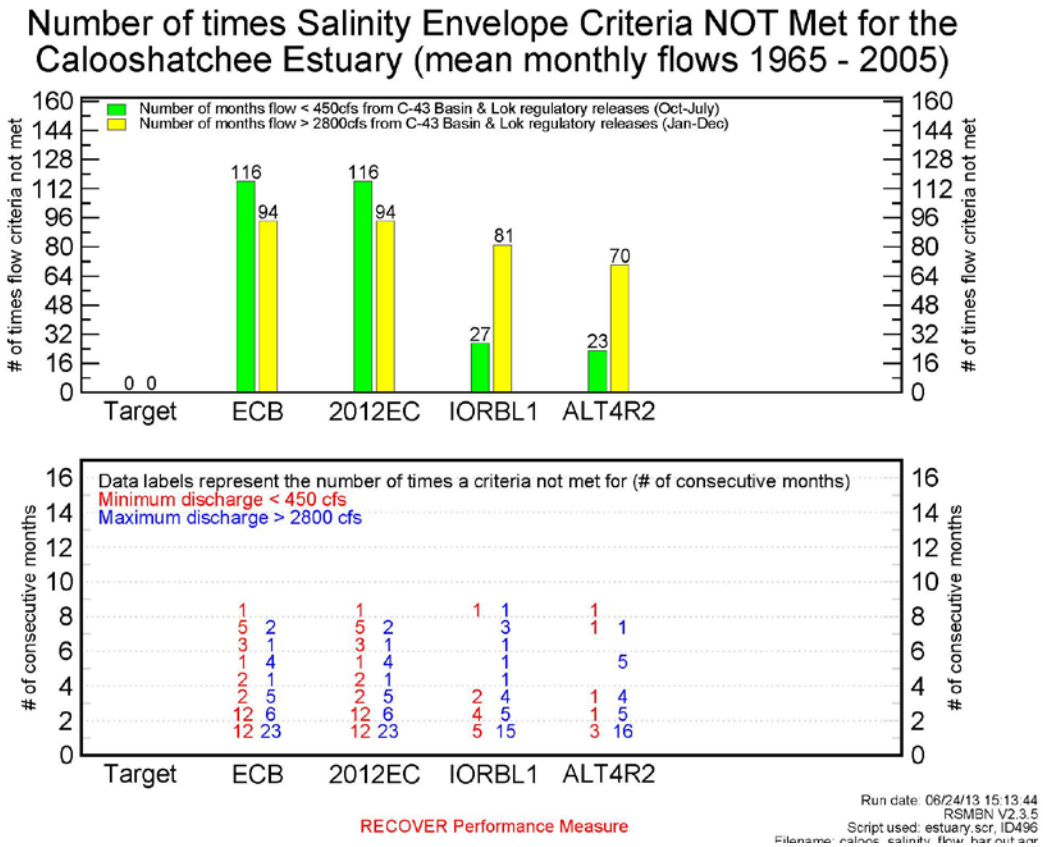

Figure B-21. Number of Times Salinity Envelope Criteria NOT Met for the Caloosahatchee Estuary (mean monthly flows 1965–2005)

St Lucie Estuary

The low flow criteria the St. Lucie Estuary is an average monthly flows of less than 350 cfs. In the St. Lucie Estuary, the number of months the low flow criteria is not met increases in the with project (Alt 4R2) condition, compared to the without-project condition (IORBL1) (**Figure B-22**). The low flow criteria is not met in 65 months out the 41-year period of simulation in Alt 4R2 and 53 months in the IORBL1. The CEPP with project condition reduces the frequency of achieving the low flow target.

Comparisons to the existing condition baselines show a significant improvement in low flow performance with Alt 4R2. Both the 2012EC and ECB show 89 months when average monthly slows are less than 350 cfs, compared to 65 months for Alt 4R2. Neither of the existing condition baselines benefit from the inclusion of the Indian River Lagoon-South Project's C-44 Basin Reservoir, which is included in the future without (IORBL1) assumptions.

Consideration of overall estuary performance indicates that Alt 4R2 provides an improvement over IORBL1 for both the St. Lucie Estuary (SLE) and Caloosahatchee Estuary (CE). In all cases, the high flow monthly exceedance counts in both the moderately high categories (SLE: 2000-3000 cfs; CE: 2800-4500 cfs) and the extremely high categories (SLE: >3000 cfs; CE: >4500 cfs) are improved. The low flow counts in the SLE warranted further review under the savings clause evaluation. The number of low flow exceedances increases from 53 in the IORBL1 to 65 in Alt 4R2. Detailed evaluation of these 12 additional months over the 41 year period of simulation, when the low flow criteria was not met for Alt 4R2, included evaluation of the magnitude of the monthly flow volume difference and the timing and duration of the events. In most cases flows came close to meeting the target (350 cfs) and only occurred one or two months in a row. However during the following four years; 1977, 1981, 1989 and 1990, the differences compared to the low flow criteria were either more extreme (flows closer to 200 cfs or less) or occurred for several months (5-6) in a row. It is worth noting also that during the entire period of record flows, mean monthly flows were not below 150 cfs. It has been observed over the past 25 years that the salinity in the middle Saint Lucie Estuary, at the (US1) bridge site, requires many months of extremely dry conditions in order for salinity to increase into ranges outside the preferred ecological envelope of 8-20 practical salinity units (psu). Although no formal study proves the hypothesis, anecdotal evidence (including monitoring and modeling) shows that currently the majority of the 350 cfs minimum target is provided to the SLE through subsurface, groundwater and un-gauged tributary flows. Consistent with this hypothesis, when there are several months in a row of zero flow out of the major gauged canals in the watershed, often the SLE salinity stays within the preferred ecological envelope. More substantial overall improvements to the health of the SLE will be realized by the reduction in high flows with Alt 4R2 when compared to IORBL1, as moderate high flows are reduced by a 10 months and extreme high flows are reduced by 5 months.

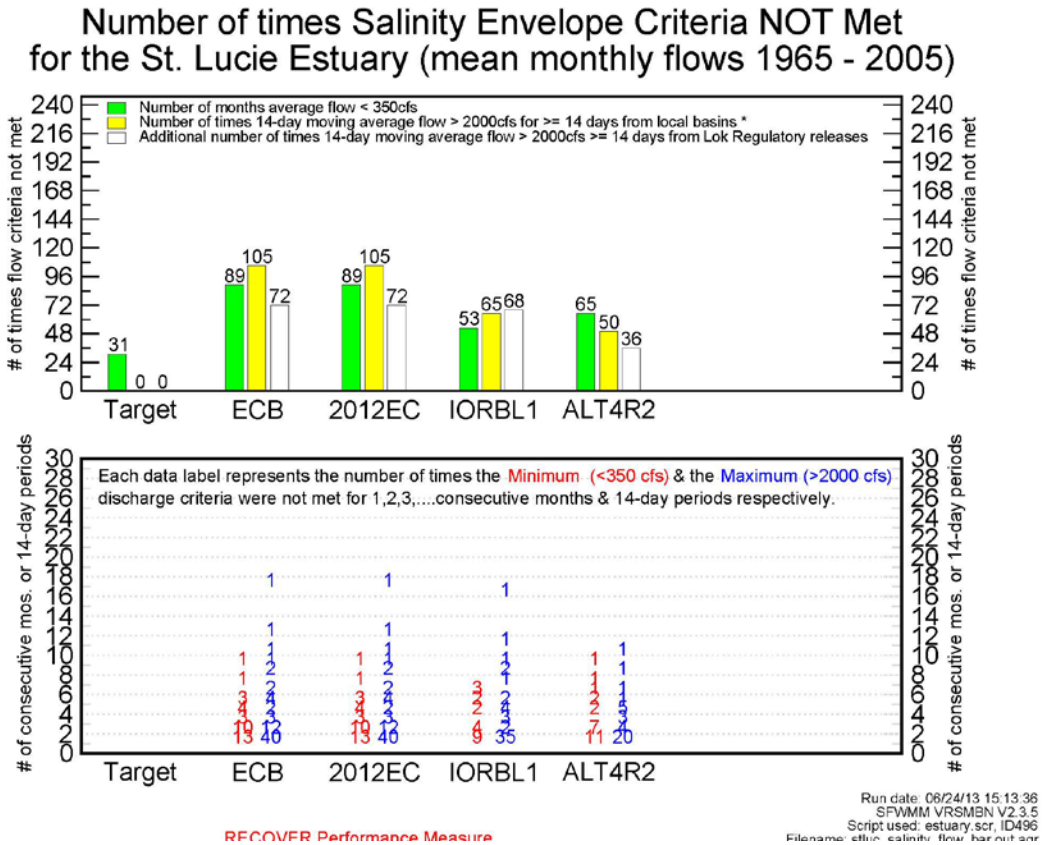

Figure B-22. Number of Times Salinity Envelope Criteria NOT Met for the St. Lucie Estuary (mean monthly flows 1965–2005)

WCA 2A

The IORBL1 condition has higher inflows to WCA 2A from STA-2 than the ECB/2012EC condition (377 kAF for IORBL1, as compared to 230 kAF for the ECB/2012EC), resultant from assumed implementation of STA-2 Compartment B, the SFWMD Restoration Strategies project, and the associated water deliveries to WCA2A. The S-7 pump station also contributes inflows to WCA 2A; S-7 inflows are reduced from 115 kAF in the ECB/2012EC to 75 kAF in the IORBL1, with this WCA 2A inflow operational shift accounting for 27 percent of the increase from STA-2 to WCA 2A. The IORBL1 provides more water than WCA 2A needs, especially when considering that 90 percent of the tree islands in WCA 2A were previously "drowned" due to deep water stress in the 1960s. Alt 4R2 utilizes some of this excess IORBL1 water, in addition to the additional flows redirected south from Lake Okeechobee, to increase the hydroperiods and achieve restoration objectives in WCA-3 and ENP through the L-6 diversion operations. With the L-6 diversion operations, for Alt 4R2, average annual inflows from STA 2 (including Compartment B) to WCA 2A are significantly decreased from 377 kAF in the IORBL1 to 236 kAF in Alt 4R2 (a 37% decrease); S-7 inflows are also reduced from 75 kAF in the IORBL1 to 68 kAF in Alt 4R2, due to operations to redirect a portion of STA-3/4 discharges away from WCA 2A to WCA 3A via the S-8 pump station. The with project condition (Alt 4R2) deliveries to WCA 2A are reduced compared to the without project condition (IORBL1) for each of the forty individual water years. The average annual water year decrease in WCA 2A inflows is 148 kAF less than IORBL1, decreasing the mean WCA 2A inflow from 438 in the IORBL1 to 290 kAF with Alt 4R2. The WCA 2A water year inflows reductions range between 43 kAF (water year 1990) to

a decrease of 315 kAF (water year 1970). The following analysis compares the hydrological and ecological implications within WCA 2A for the ECB, IORBL1, and Alt 4R2. The comparison indicated little or no difference between ECB, IORBL1, and Alt 4R2.

Comparing ponding depths for a representative wet year of 1995 (**Figure B-23**), there is no significant difference between the ECB and Alt 4R2. There is however, deeper water, on average, in the northwestern region of WCA 2A with the IORBL1. This additional water during a wet year is not ecologically valuable as it may confound restoring the ghost tree islands that remain.

On-the-other-hand, ponding depths during a representative dry year of 1989 (**Figure B-24**) indicate a very different pattern than seen during the wet year example. Here, Alt 4R2 is similar to the IORBL1 rather than the ECB. Both the IORBL1 and Alt 4R2 do a better job of protecting the northwestern region of WCA 2A from soil oxidation and peat loss than the ECB.

During average and wet years, difference maps (Alt 4R2 minus IORBL1 or Alt 4R2 minus ECB) for stage and hydroperiods indicated no significant differences for WCA 2A. Stage and hydroperiod differences between the ECB, IORBL1, and Alt 4R2 were best seen during dry years. For example, the spatial distribution of hydroperiods in 1989 showed three slightly different patterns (**Figure B-25**). The ECB had two cells with a hydroperiod of 0-60 days and a relatively large number of cells with hydroperiods of only 60-120 days, indicating a high potential for soil oxidation and peat fires for 1989 hydrologic conditions. Alt 4R2 improves upon the ECB performance by reducing the areal extent of regions with hydroperiods less than 120 days and increasing the areal extent of regions with hydroperiods of more than 330 days (especially in the NW region of WCA 2A). The IORBL1 performed better than Alt 4R2 for preventing soil oxidation because 95% of the WCA had a hydroperiod greater than 120 days.

Surface water flow vectors between Alt 4R2 and the IORBL1 were not found to be significantly different. However, differences in surface water flow vectors between Alt 4R2 and the ECB are apparent, but only for dry years (**Figure B-26**). The 1989 Alt 4R2 and IORBL1 surface water flow vector maps indicate a general northwest-to-southeast flow directionality and movement of water into WCA 2B. The 1989 ECB flow map indicates a general north-to-south flow directionality, no flow in a large area along the eastern boundary of WCA 2A, and little movement of water into WCA 2B.

In conclusion, Alt 4R2 is an improvement over the ECB because it does a better job of moving water through to WCA 2B and WCA-3A, while preventing soil oxidation during dry years. Alt 4R2 is similar and likely not different from the IORBL1 in terms of moving water through to WCA 2B and WCA-3A and preventing soil oxidation during dry years.

In addition, Alt 4R2 hydrologic performance in WCA 2A is consistent with the mitigation associated with construction and operation of the Compartment B of ECP STA-2. The hydroperiod targets identified in the FDEP permit were applied during CEPP plan formulation and were maintained despite the L-6 diversion operations.

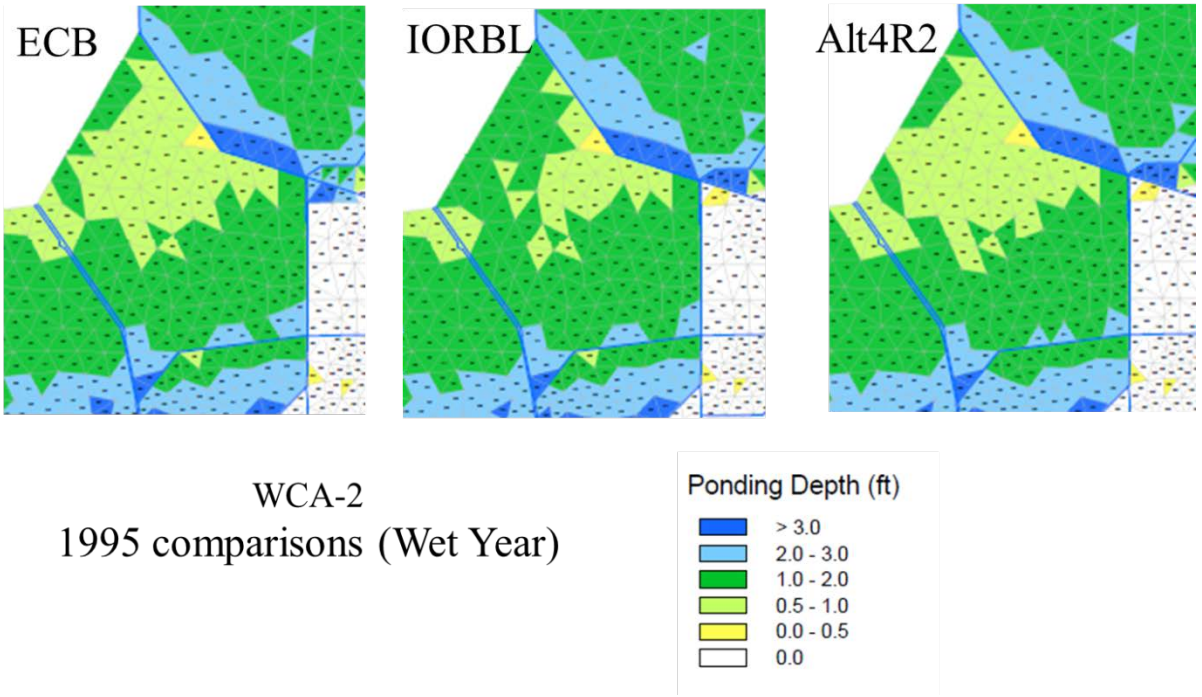

Figure B-23. Wet Year (1995) Ponding Depth Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

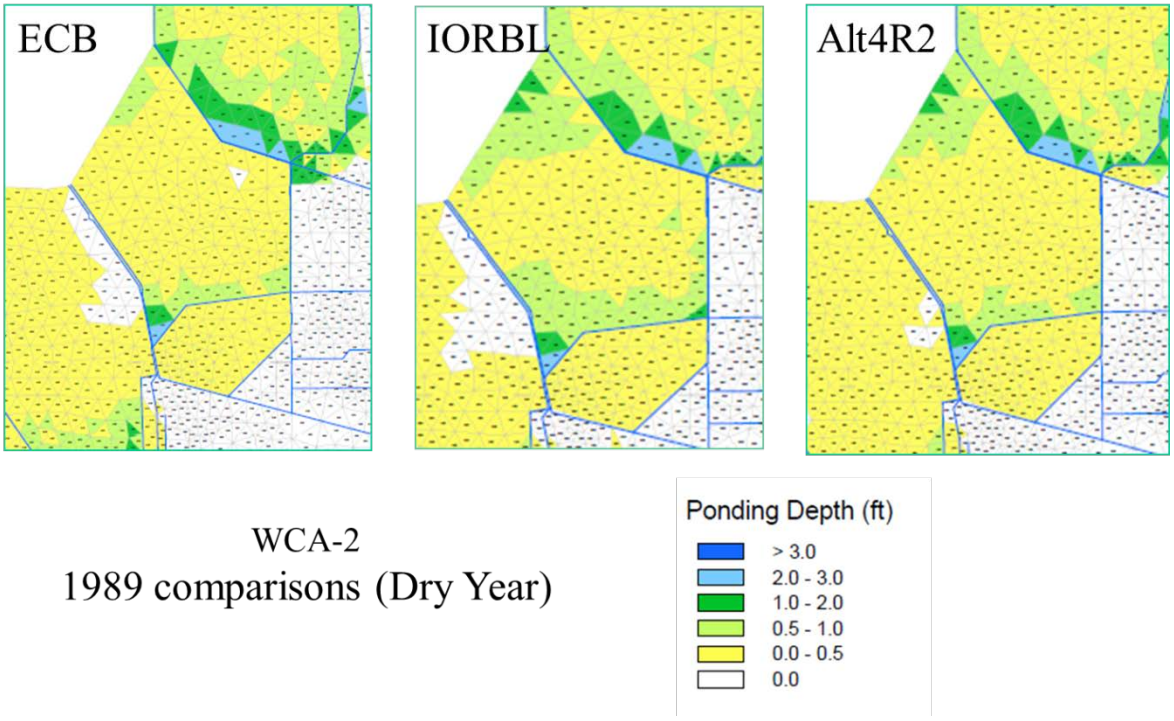

Figure B-24. Dry Year (1989) Ponding Depth Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

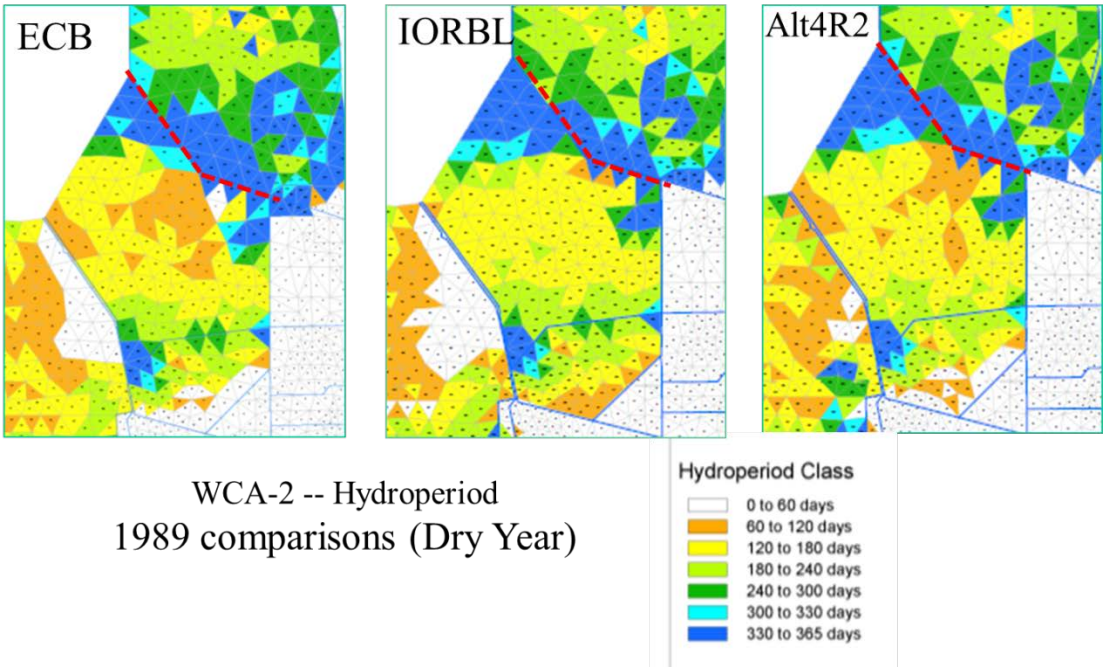

Figure B-25. Dry Year (1989) Hydroperiod Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

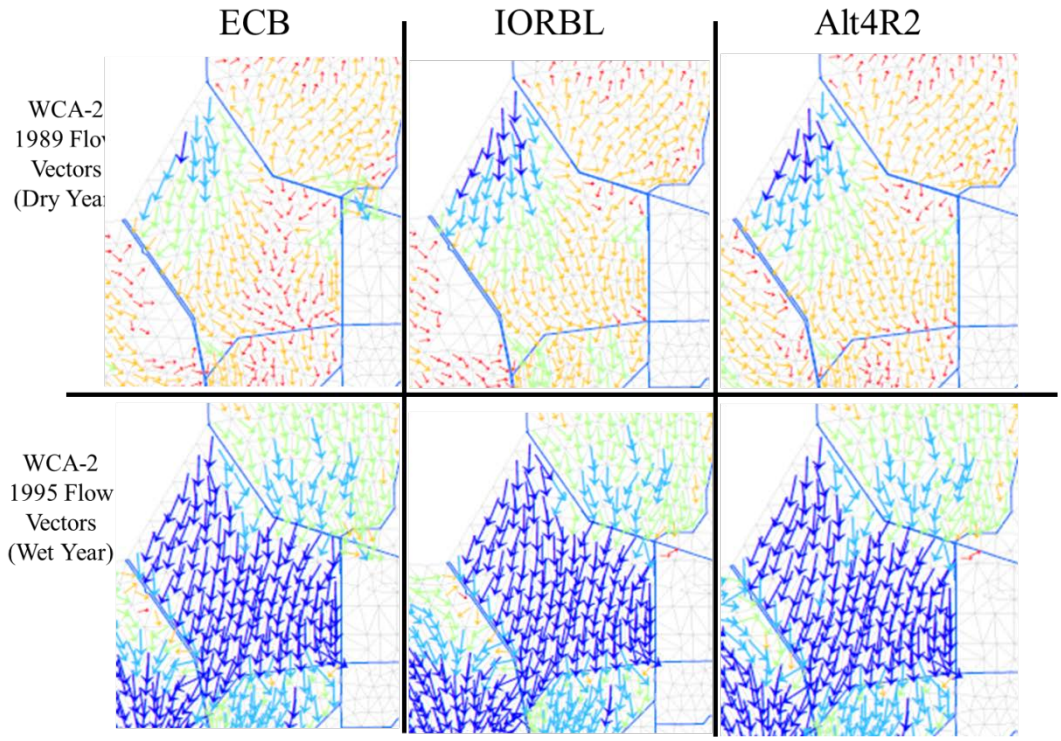

Figure B-26, Surface Water Flow Vector Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

WCA 3A

For WCA 3A, water deliveries into WCA 3A are displayed in **Figure B-27**. This probability exceedance plot displays the average annual water year delivery for the 41 year period of simulation. Surface water inflows along the redline to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the ECB, 2012EC, and IORBL1 base conditions; for Alternative 4R2, the combined flows from the S-8 pump station discharges to the Miami Canal and discharges to the S-8A gated culvert (which diverts water to the L-4 Levee degrade gap) are included in addition to S-150 and STA-5/STA-6 outflows to WCA 3A. Compared to the existing condition (ECB/2012EC), inflows to WCA 3A are reduced in the future without condition (IORBL1) due to the increased utilization of STA-2 associated with the IORBL1 assumed implementation of STA-2 Compartment B and the SFWMD Restoration Strategies project; STA-2 discharges to WCA 2A, resulting in a corresponding reduction to WCA 3A inflows. The with project condition (Alt 4R2) deliveries exceed the without project condition (IORBL1) for each of the forty total individual water years. The average annual water year increase in WCA 3A inflows is 362 kAF greater than IORBL1, increasing the mean WCA 3A inflow from 538 in the IORBL1 to 900 kAF with Alt 4R2. The WCA 3A water year inflow increases range between 35 kAF (water year 1990) to an additional 924 kAF (water year 1996).

The following quantification for the change in combined inflows to WCA 2A and WCA 3A (the CEPP formulation redline) is provided for consistency with the quantification of additional redline flows provided in the PIR main report. The average annual Alt4R2 water year increase for combined WCA 2A and WCA 3A inflows is 214 kAF kAF greater than IORBL1 (210 kAF greater than the FWO), with the mean combined WCA 2A and WCA 3A inflow increased from 976 in the IORBL1 to 1190 kAF with Alt 4R2. Eight of the forty total individual water years (1972, 1973, 1977, 1978, 1982, 1986, 1990, and 1991) indicate slight reductions of 8 to 43 kAF for combined WCA 2A and WCA 3A inflows, while water years 1987 and 2002 indicate larger reductions of 123 kAF and 86 kAF, respectively; the remaining 30 water years indicate increased combined inflows to WCA 2A and WCA 3A.

Based on comparison of the existing conditions, 2012EC and ECB, the with project Alt 4R2 inflows to WCA 3A are greater at all times except at the most extreme dry time, the 98th percentile.

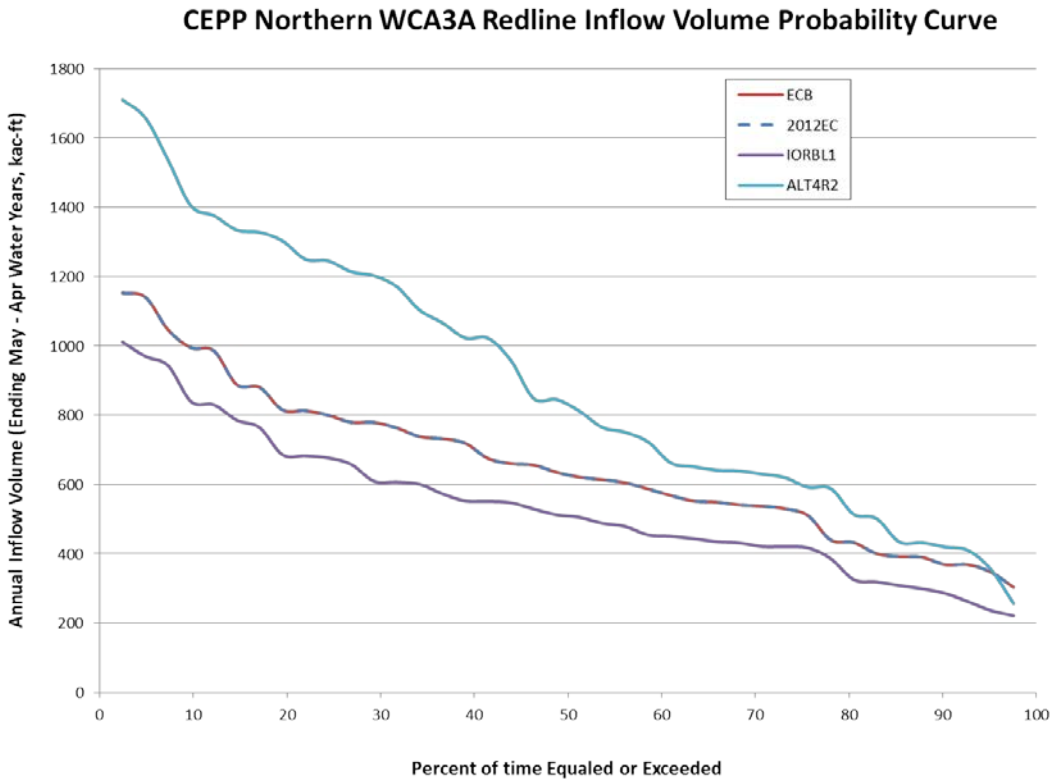

Figure B-27. CEPP Northern WCA 3A Redline Inflow Volume Probability Curve

Biscayne Bay

For the savings clause evaluation, surface water flows through multiple structures are evaluated. The structures are summed across all of Biscayne Bay and grouped by spatial sub-regions as well. Comparison of the sum of mean annual structure flows in the with project condition (Alt 4R2) to the without-project condition (IORBL1) indicates the total inflows are slightly increased with Alt 4R2 (839 kAF for IORBL1; 865 kAF for Alt 4R2). Each of the sub-regions are unchanged, with the exception of the South-Central sub-region (**Table B-7**).

The with project condition (Alt 4R2) was also compared to the existing condition baselines (2012EC and ECB). The total mean flows are slightly increased for Alt 4R2, with a slight reduction observed for the Central sub-region.

The South-Central sub-region flows were also compared to the target flows identified in the Biscayne Bay Water Reservation Rule recently adopted by the SFWMD (518,759 AF/yr). The with project condition (Alt 4R2) quantity and timing of flows performs similar to the without-project condition (IORBL1) (**Figure B-28**).

Table B-7. Mean Annual Structure Flows to Biscayne Bay for Each Condition

Subregion: Structures	Mean Annual Structure Flows to Biscayne Bay (kAF)			
	ECB	2012EC	IORBL1	Alt 4R2
North: S29, S28, S27	334	333	356	356
Central: S26, S25B, S25, G93, S22	274	276	259	259
South-Central: S123, S21, S21A, S20G, S20F	214	218	220	246
South: S20	4	4	4	4
Total	826	831	839	865

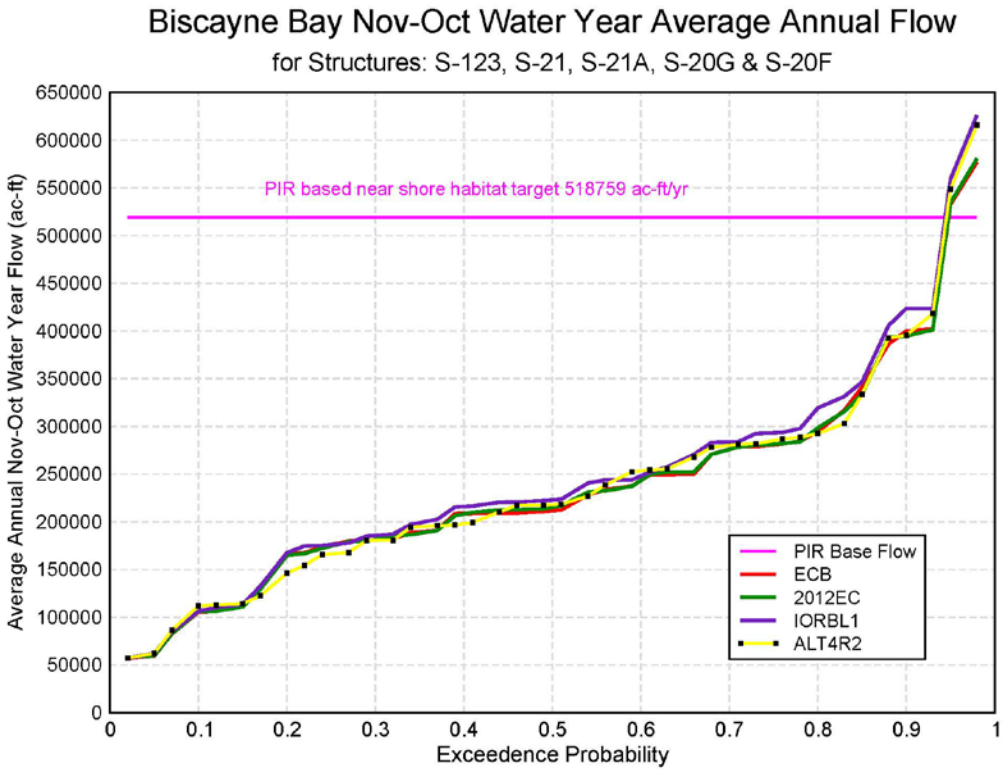

Figure B-28. Biscayne Bay November–October Water Year Average Annual Flow

Manatee Bay – S-197

The S-197 gated culvert structure, at the southern end of the C-111 canal, is the terminal structure of the SDCS. The S-197 is operated with the primary purpose of flood control and prevention of saltwater intrusion and strongly influences hydrologic conditions in the southeastern Everglades, the Model Lands, and developed areas of southern Miami-Dade County. Discharges passing through the structure's 13 gated culverts flow into Manatee Bay, which is directly connected to Barnes Sound. These water bodies are the most southerly portion of the Biscayne Bay system, but also have a relatively small exchange of water with eastern Florida Bay through culverts under U.S. Highway 1 and the highway's bridges.

An objective of the C-111 South Dade Project and CERP's C-111 Spreader Canal Western Project has been to minimize pulse flood control releases from S-197 and maximize sheetflow of water toward and within Everglades National Park (ENP), including Taylor Slough and the ENP panhandle marshes that receive water overflowing the southern bank of the lower C-111 Canal. Pulse releases from S-197 can rapidly and harmfully decrease local salinity in downstream estuaries and also create water column density stratification, which increases the risk of hypoxia at the bay bottom. Such problems were observed following Hurricane Katrina in 2005. However, it is notable that salinity conditions in Manatee Bay and Barnes Sound are currently much higher than before drainage of the Everglades in the early twentieth century and construction of the SDCS in the 1970s; salinity levels tend to be close to that of ocean water. While water supply to estuaries via canals is unnatural and generally undesirable, the watershed of Manatee Bay and Barnes Sound is isolated by highways and canals flowing east toward Biscayne Bay proper. Given this isolation from fresh water flow, Manatee Bay and Barnes Sound can gain some benefits from modest C-111 discharges via S-197.

CEPP modeling of S-197 discharges showed that mean annual discharges from S-197 were much higher under ECB than under the IORBL1 or any of the evaluated CEPP restoration alternatives, including Alt 4R2 (**Table B-8**). This is likely because the C-111 Spreader Canal Western PIR Project operations were included in all scenarios other than ECB and this project's features (including pump stations S199 and S200, as well as the associated Frog Pond Detention Area) effectively minimizes flood control discharges from S-197, while providing resultant sheetflow benefits to ENP wetlands and Florida Bay. Only slightly more water is discharged into Manatee Bay through S-197 with Alt 4R2 than with IORBL. The overall shape of the discharge rate – frequency curves shown in **Figure B-29** remained similar for all alternatives, but for any given discharge rate, the frequency with ECB was roughly double that of any other with project alternative.

In conclusion, CEPP can be expected to have little effect on S-197 discharges and consequently not alter its current effects, whether negative or positive, on Manatee Bay and Barnes Sound. Restoration of these downstream estuaries will require further CERP progress, with implementation of the second phase of the CERP C-111 Spreader Canal Western Project.

Table B-8. Mean Annual Discharges from S-197

Mean annual discharges from S-197 (ac-ft)	
ECB	16.5
IORBL1	6.7
Alt 4R2	8.2

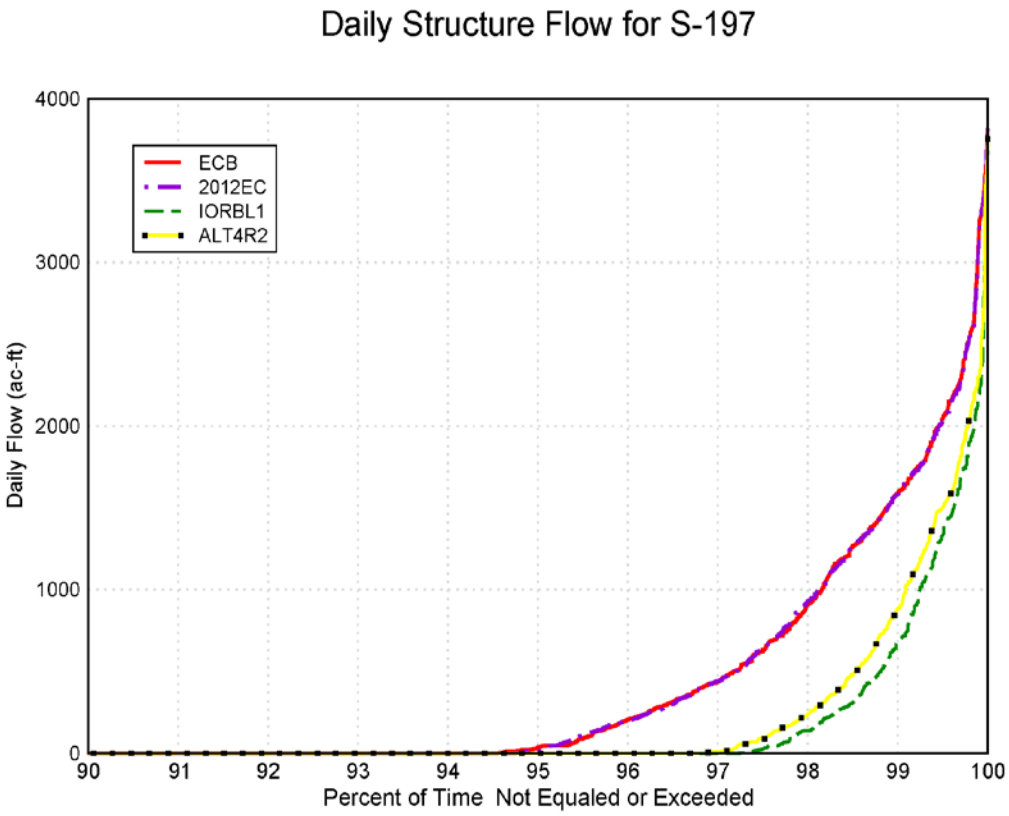

Figure B-29. Exceedance Probability of Daily Structure Flow for S-197

Florida Bay

For the savings clause evaluation, overland flows towards Florida Bay at two different locations are evaluated. Specifically, the volume probability curves for the average annual water year flows for the 41 year period of simulation for Transect 23 and Transect 27 are evaluated. For Transect 23, the with project condition (Alt 4R2) deliveries exceed or are similar to the without project condition (IORBL1) for most rank-sorted probabilities. Although the volume probability curves increase from 90 to 50 to 10 for both conditions they do not necessarily progress in the same way across the distribution (**Figure B-30)**. At four probabilities, the without project condition exceeds the with project condition by between less than 1 kAF to less than 6 kAF. To place this volume in perspective, 6 kAF represents 2.6% of the mean annual flows (the 50th percentile). For Transect 27, the with project condition (Alt 4R2) deliveries exceed or are similar to the without project condition (IORBL1) for each probability (**Figure B-31).**

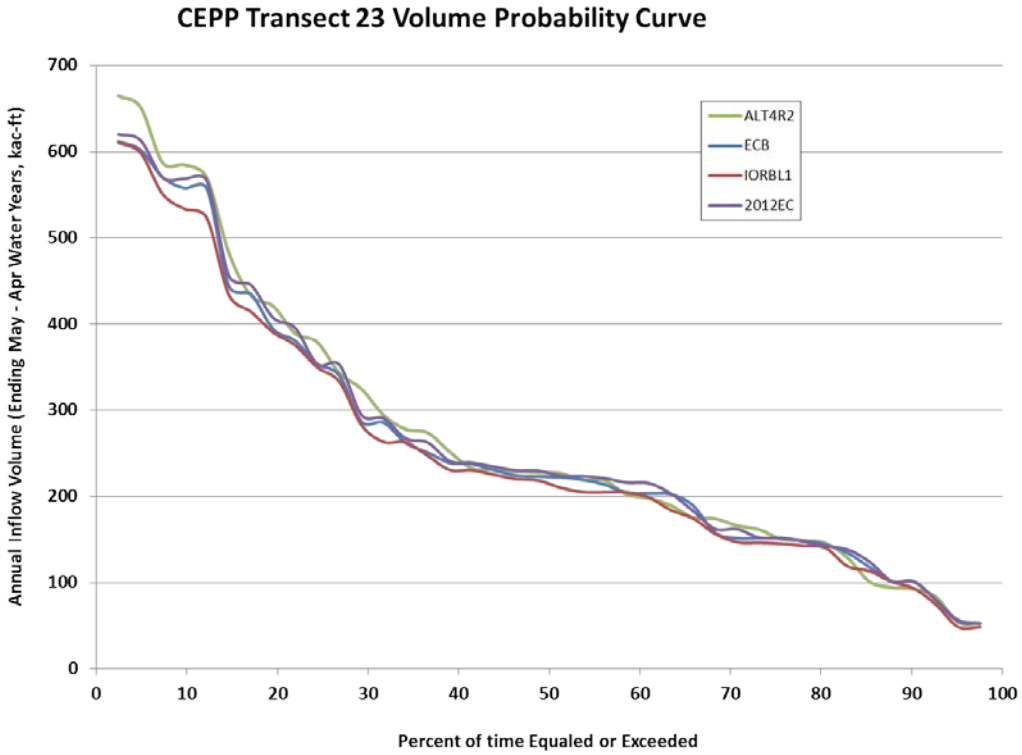

Figure B-30. CEPP Transect 23 Volume Probability Curve

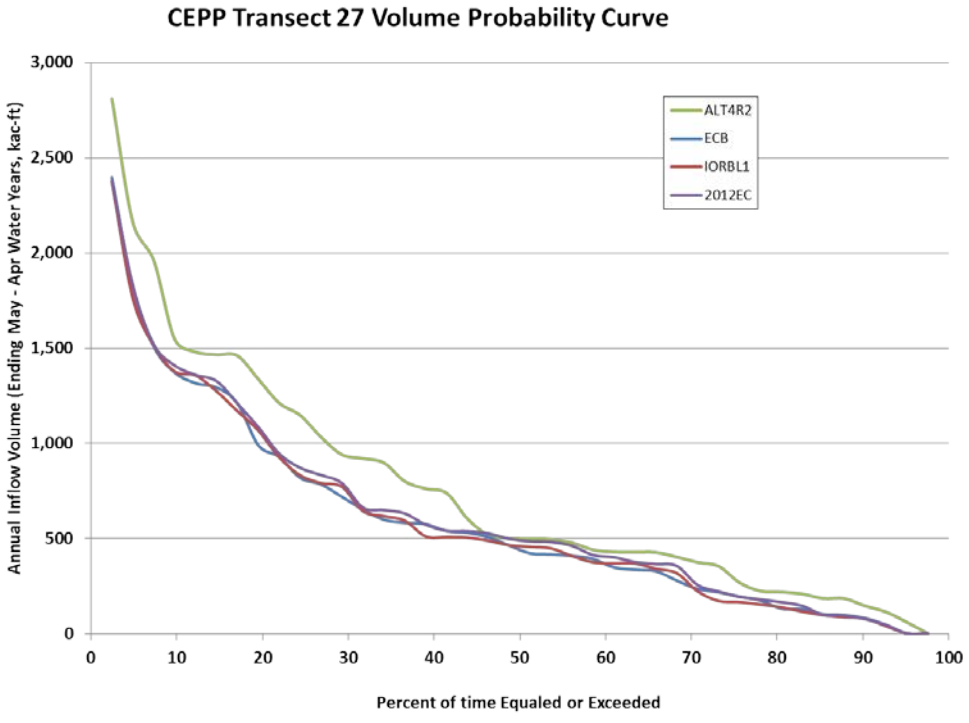

Figure B-31. CEPP Transect 27 Volume Probability Curve

B.3.2 Savings Clause - Flood Protection

The four features or areas affected by the project that will be analyzed include 1) the potential risk to HHD due to changes in the lake's stages, 2) the FEB located in the EAA, 3) the effects of changed water levels in WCAs 3A and 3B on the East Coast Protective levees L-67 and L-30, and 4) the mix of agricultural and urban areas located east of the East Coast Protective levees L-31N and L-31W. In addition, areas of interest to the Seminole Indian Tribe of Florida and the Miccosukee Tribe of Indians of Florida, including Tribal reservations, are assessed in **Section 3.2.6** and **Section 3.2.7**, respectively.

B.3.2.1 Lake Okeechobee Herbert Hoover Dike

As a result of the CEPP preliminary screening process, operational changes were incorporated into the hydrologic modeling conducted for the CEPP alternatives, including the Alt 4R2, in efforts to optimize CEPP system-wide performance within the available flexibility of the 2008 LORS. More specifically, the hydrologic modeling of the CEPP alternatives included proposed revisions to the 2008 LORS decision tree outcome maximum allowable discharges dependant on the following criteria: Lake Okeechobee inflow and climate forecasts (class limits were modified for tributary hydrologic conditions, seasonal climate outlook, and multi-seasonal climate outlook), stage level (regulation zone), and stage trends (receding or ascending). While some refinements were made within the operational flexibility available in the 2008 LORS, consistent with the original modeling intent, the final operational assumptions ultimately extended beyond this flexibility due to adjustments made to the tributary/climatological classifications. Additional information and summary documentation of these assumptions can be found in Section A.8.3.2.3.3 of the Engineering Appendix.

Based on the hydrologic modeling conducted for the CEPP TSP (Alternative 4R2), it is anticipated that changes to the 2008 LORS will be needed in order to achieve the complete ecological benefits envisioned through implementation of CEPP and to address the minor to moderate adverse effects indicated with future without project condition. The CEPP PIR, including the Project Operating Manual (POM), will not be the mechanism to propose or conduct the required NEPA evaluation of modifications to the Lake Okeechobee Regulation Schedule, although the CEPP PIR may recommend that revisions to the 2008 LORS be conducted through a separate effort.

Lake Okeechobee stage duration curves for the RSM-BN model representation of the ECB/2012EC (LORS 2008; note that plot lines overlap), IORBL1 (LORS 2008, plus additional CERP and non-CERP projects), and Alternatives 4R2 (LORS 2008, additional CERP and non-CERP projects, and prescribed assumed operational flexibility) are included as **Figure B-32** (note: upper 25% of the stage duration curve is displayed). Peak stages for the CEPP Savings Clause baselines and Alternative 4R2 are summarized as follows: 17.54 feet NGVD for the 2012EC; 17.52 feet NGVD for the IORBL1; and 17.66 feet NGVD for Alternative 4R2. The baselines and the TSP Alternative 4R2 all show simulated stages above 17.25 feet NGVD: 18 days for the 2012EC; 9 days for the IORBL1; and 29 days for Alternative 4R2 (note: 14,975 days in the RSM-BN 41-year period of simulation). The USACE LORS 2008 Environmental Impact Statement (EIS) assessment recognized that minimizing the frequency of exceedance of the 17.25 feet elevation offers additional protection for public safety and the HHD, for the condition prior to completion of the current approved and planned HHD remediation measures, and this criterion was evaluated as a LORS project performance measure. Significant increases in the frequency, duration, and magnitude of Lake Okeechobee peak stages do not result from the assumed modified Lake Okeechobee operations with the CEPP alternatives (including Alternative 4R2), despite the assumed completion of HHD remediation measures, because the adverse ecological effects associated with increased lake

stages and the associated increases in high volume releases to the estuaries were effectively balanced during the CEPP preliminary screening (for additional discussion of screening metrics, refer to **Section 3** of the PIR main report). Following completion of the HHD remediation of Reaches 1, 2, and 3, the degree to which higher maximum lake stages and increased frequency and duration of high lake stages would be accepted, if at all, will be contingent on the conclusions identified in the 2014 DSMR (note: this process is independent and separate from the CEPP project).

Given recognition of the DSMR uncertainty and the continued utilization of the LORS 2008 Lake Okeechobee Regulation Schedule for CEPP, the USACE assessment of the Lake Okeechobee high water performance with CEPP indicated consistency with the HHD formulation assumptions established for the CEPP future without project condition (FWO/IORBL1), which included general consideration of potential risk and uncertainty associated with increased lake stages. Lake Okeechobee high water performance requirement will likely need to be revisited following completion of the 2014 DSMR, but the CEPP stage duration curve trends for increased high water conditions appear reasonable based on the USACE current best available information and current expectations for the HHD remediation.

Extreme high lake stages have also been documented to adversely impact the plant and animal communities, through processes which include the following: physical uprooting of emergent and submerged plants; reduced light levels in the water column due to increased suspended sediment; and littoral zone exposure to increased nutrient levels from the water column. The frequency of occurrence for lake stages above 16.0 feet, 16.5 feet, 17.0 feet, and 17.25 feet are summarized in **Figure B-33**. Lake Okeechobee stages between 16.0 and 17.25 feet NGVD correspond to the seasonal range of the top zone of the 2008 LORS Regulation Schedule, and this performance metric was considered by the USACE during the LORS Regulation Schedule study. Refer to **Section 5** of the main PIR report and Appendices C.2.1 and C.2.2 for the environmental effects evaluations for Lake Okeechobee, which were determined to be approximately equivalent across the CEPP future with project alternatives. As documented in **Section 4** of the main PIR report, habitat units were not calculated for Lake Okeechobee since the performance of these areas were considered a constraint during formulation.

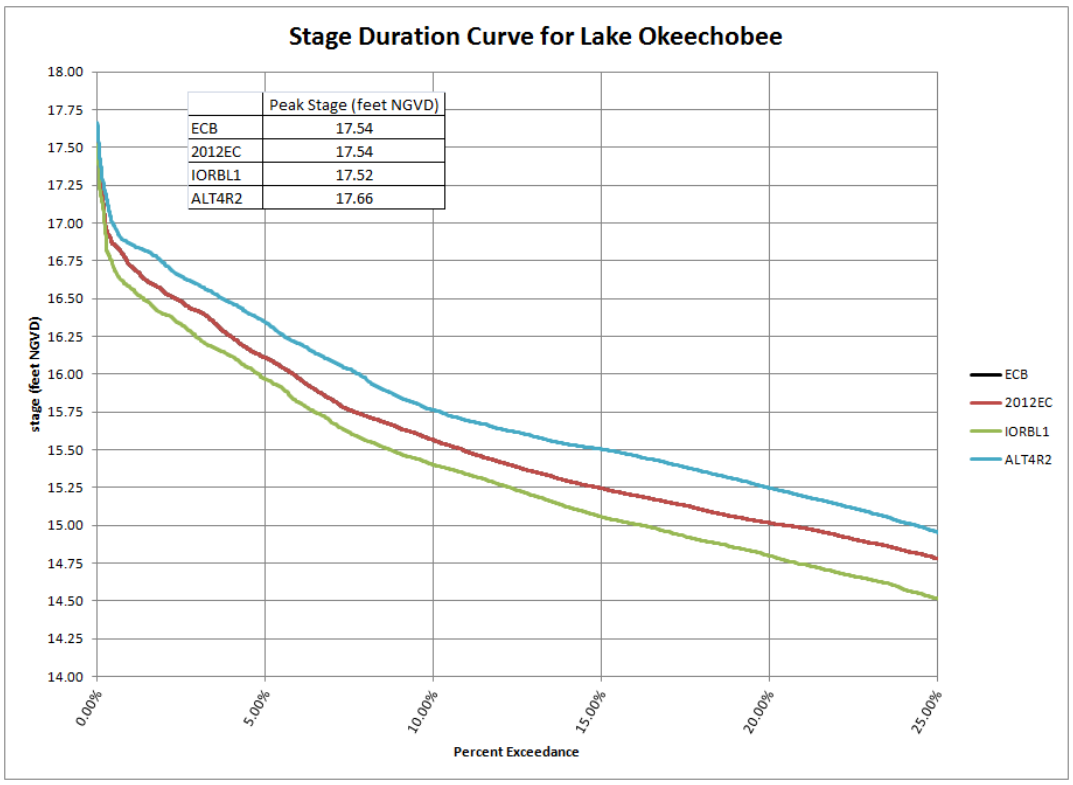

Figure B-32. Lake Okeechobee Stage Duration Curve

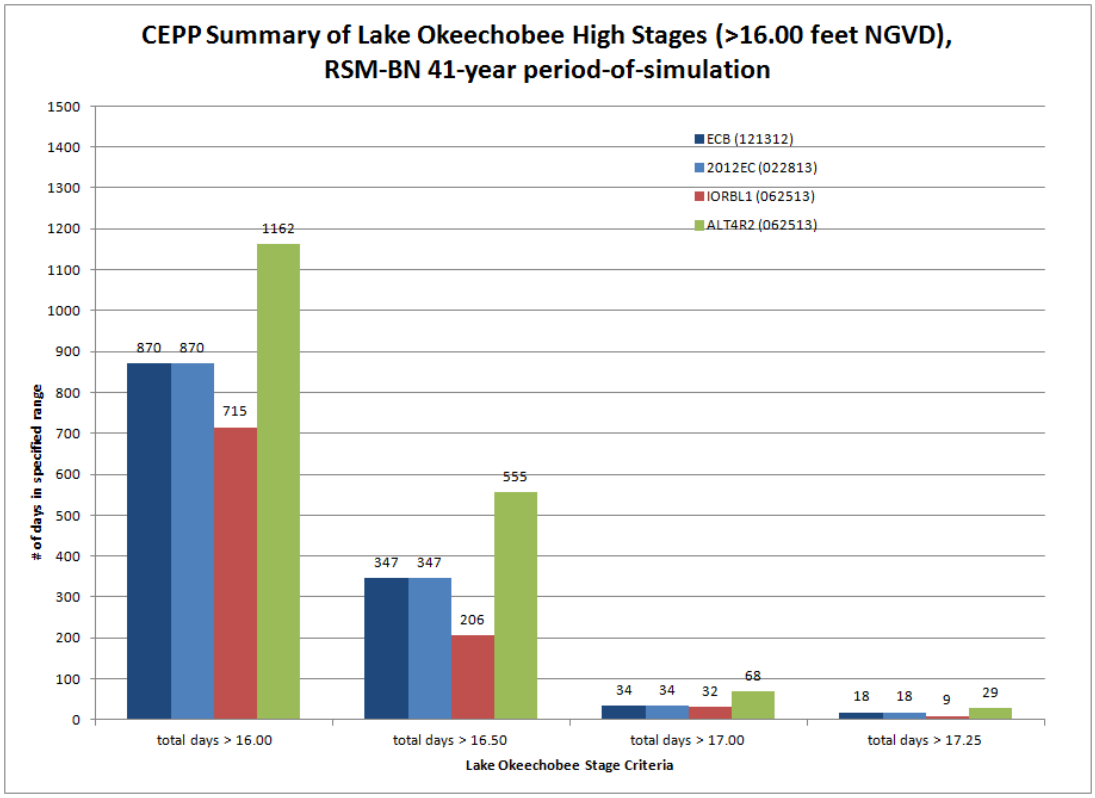

Figure B-33. Occurrence Frequency of Lake Okeechobee High Stages

B.3.2.2 FEB located in the EAA

Stage duration curves for the combined CEPP A-1 and A-2 FEB are shown in **Figure B-34** for the IORBL1 (14k acre A-1 FEB only) and Alternative 4R2. Ground surface elevations within the FEB were assumed at 9.63 feet NGVD for the RSM-BN modeling. Minor changes to groundwater levels are expected adjacent to the CEPP A-2 FEB (14,000 acres), compared to the future without project condition (IORBL1) which includes the SFWMD Restoration Strategies A-1 FEB.

The A-2 FEB design includes perimeter seepage collection canals and associated seepage pumps to limit potential impacts. The FEB at this time carries a low hazard potential classification (HPC) per CERP Design criteria Memoranda (DCM) 1, which is extended to embankment design. Embankment top widths are 14 feet wide per DCM-4, with dam heights based on analysis of the following criteria (USACE Engineer Regulations (ER) 1110-8-2(FR), ER-1110-2-1156, DCM-2, and risk). The FEB perimeter levee elevation is established at 20.3 feet NGVD, three feet above the maximum surcharge pool elevation. As described in further detail in the Engineering Appendix accompanying the CEPP PIR (Appendix A), the maximum surcharge pool elevation is based on the greatest elevation resulting from the following storm routings: a. The Inflow Design Flood (IDF), which is identified as the 100-yr 24-hr storm event for the CEPP FEB, per DCM-2; b. the 50% 72-hr PMP per ER-1110-8-2(FR); and c. wind setup and wave run-up analysis on critical fetch lengths with the impoundment at full pool. An orifice-type spillway will provide uncontrolled discharge from the A-2 FEB during extreme events, when FEB discharges are required to protect the embankment integrity. The spillway will include a 265 foot long weir with crest elevation set at 13.50 ft NGVD. The spillway will discharge into the adjacent seepage canal along the northern portions of the A-1 and A-2 FEBs. The spillway will be located in line with the northern extent of the eastern perimeter levee, adjacent to structure S-628.

Detailed CEPP assessments within the EAA are not available because the RSM-BN does not simulate groundwater within the EAA. Further assessment of potential effects from the A-2 FEB will be deferred to the PED phase of CEPP.

For flood protection in the EAA, the additional storage volume provided by the construction and operation of impoundments is expected to incidentally improve flood protection in the vicinity of the impoundments. For the FEB, available storage in the impoundments will be utilized to maximize flood control and reduce or eliminate discharges to the WCAs or released to tide associated with anticipated heavy rainfall from tropical storms or hurricanes. The control of seepage from project components will also help to assure that the existing level of service for flood protection is maintained and surrounding lands are not adversely impacted. An Emergency overflow spillway for the A-2 FEB will provide protection for project embankments integrity during extreme storm events.

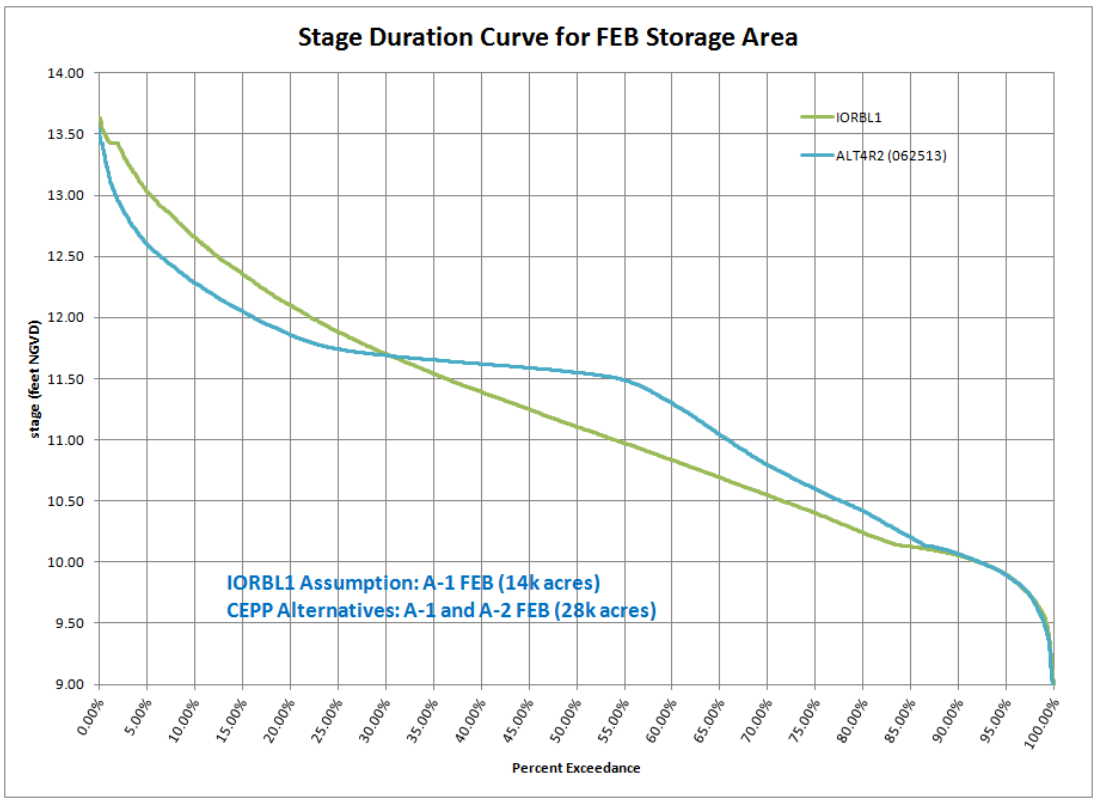

Figure B-34. FEB Stage Duration Curves

B.3.2.3 EAA/Northern WCA 3A – Backfilling of Miami Canal

The CEPP Alt 4R2 proposes to backfill the Miami Canal downstream starting 1 ½ miles south of the S-8 pump station (refer to **Figure B-16** for map) and extending to I-75. Without maintenance of the existing capacity for flood control within the EAA, flood control capability would be diminished. The CEPP plan formulation process assumed that the pre-project flood protection level of service for the EAA would be maintained under CEPP by providing the same total pumping capacity at the S-8 (4170 cfs) and S-7 (2490 cfs) pump stations, which provide drainage for the upstream EAA basin. No new structures are proposed under CEPP to further supplement the G-404 and S-8 pump stations for deliveries from the Everglades Agricultural Area (EAA) to WCA 3A.

CEPP will maintain this existing design capacity for the S-8 complex through a combination of pump station design modifications, a new hydraulic connection from S-8 to the degraded L-4 Levee, utilization of the existing G-404 pump station (570 cfs design capacity), and leaving the 1-2 mile segment of the Miami Canal as available getaway conveyance capacity during peak flow events. S-8 modifications should be completed to permit the diversion of L-6 flows and must maintain flood control operation capability during implementation of S-8 modifications. The Alt 4R2 cost estimate includes placeholder funding for any required modifications of the S-8 outlet works, to address potential increased tailwater conditions with CEPP that may diminish the S-8 pump efficiency. Modifications of the S-8 pump station complex for CEPP operations will be further analyzed during the PED phase of CEPP, since the RSM-GL model applied for CEPP formulation is inadequate for detailed hydraulic design of the S-8 pump station complex; potential design modifications to be assessed/reassessed in further detail during PED will likely include the following: modifications to S-8 and/or G-404, to address pump efficiency concerns; the

proposed S-8A culvert and associated canal connecting the Miami Canal to the L-4 Canal; and the required length of the unmodified Miami Canal to maintain hydraulic getaway conveyance capacity.

No design modifications to S-7 are proposed with Alt 4R2, and the S-621 gated spillway proposed on the STA-3/4 outlet canal has been initially designed at 2500 cfs to maintain the capability to deliver the S-7 design capacity flows from STA-3/4 to the S-7 pump station.

B.3.2.4 WCA 3A and WCA 3B

Compared to the CEPP FWO (final December 2012 release), the CEPP alternative 4R2 stages are lowered by approximately 0.1-0.3 feet in the upper 10 percent of the stage duration curve for the WCA 3A three-gauge average stage, as shown in **Figure B-35** (upper 25 percent of the stage duration curve); the same performance is observed in the IORBL1. In order to consider potential differences during specific years, the EN-W assessment also considered the annual duration of exceedance of the ERTP WCA 3A Zone A stage levels for the complete period of simulation (**Figure B-36**). The annual durations were also displayed and assessed as a frequency curve (**Figure B-37**). The total number of days above Zone A is summarized as follows for the IORBL1 and CEPP alternatives (with percent of total period of simulation, 14975 days, in parentheses): CEPP IORBL1 – 2751 days (18.37%); and Alternative 4R2 – 3323 days (22.19%).

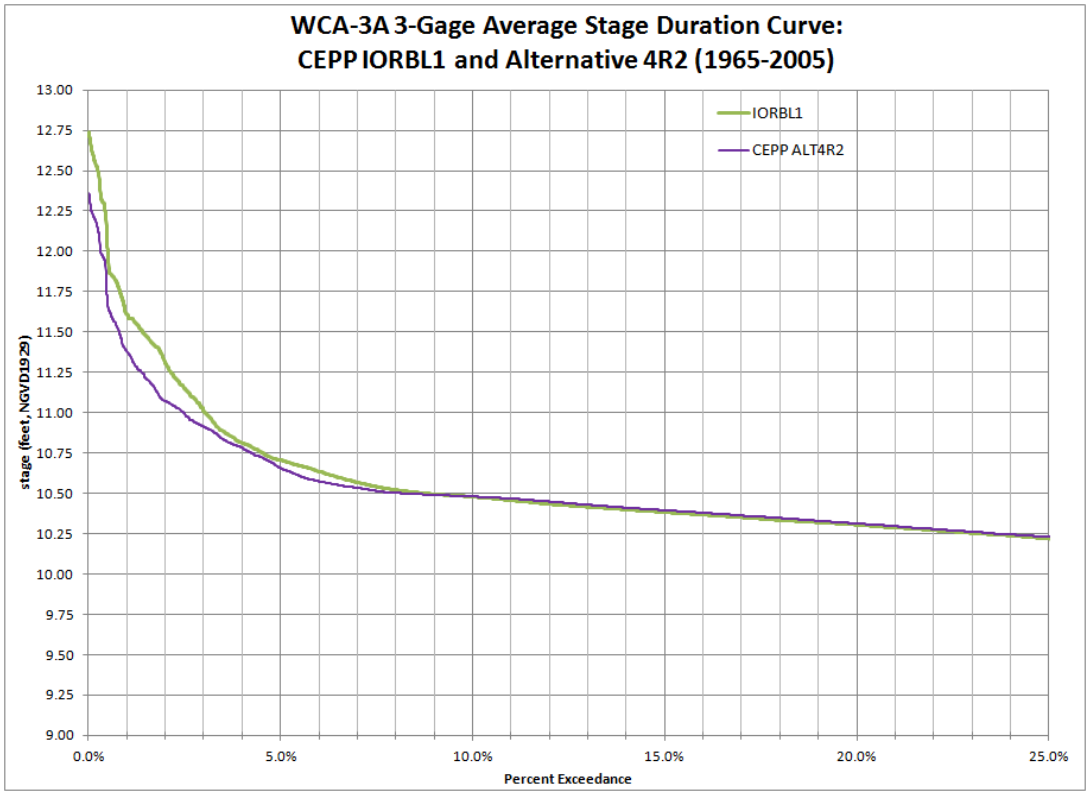

Figure B-35. WCA 3A Three-Gauge Average Stage Duration Curve

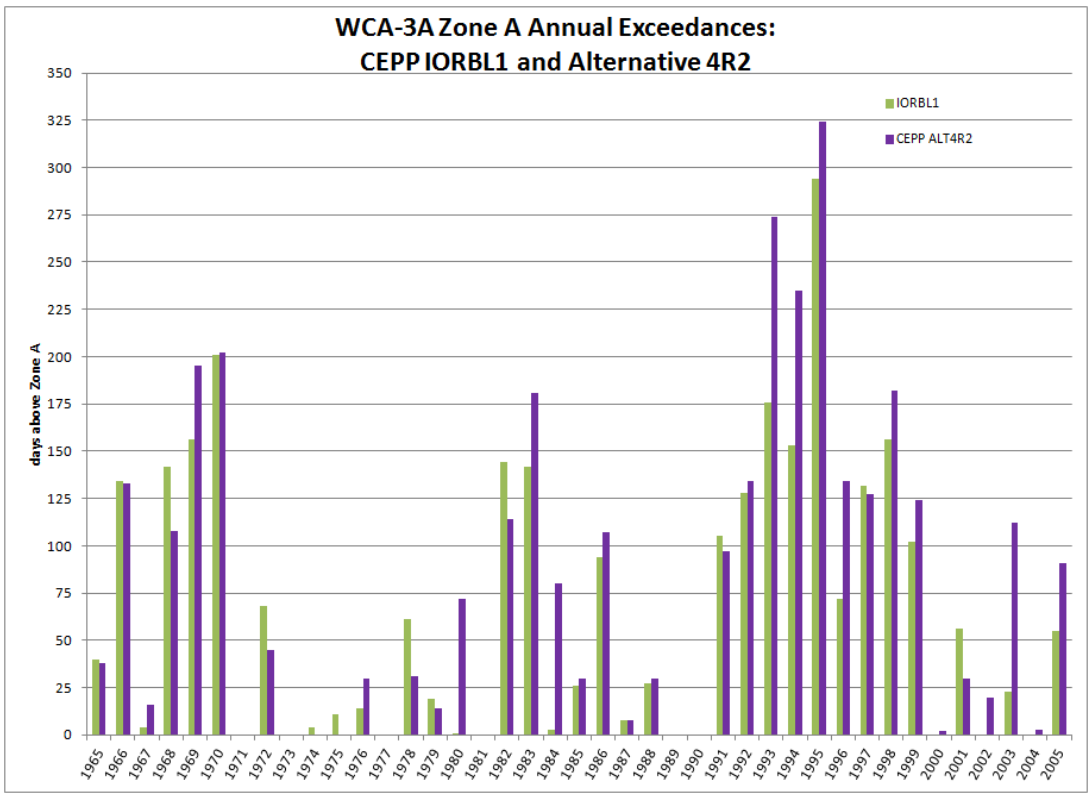

Figure B-36. WCA 3A Three-Gauge Average Annual Zone A Exceedance Summary

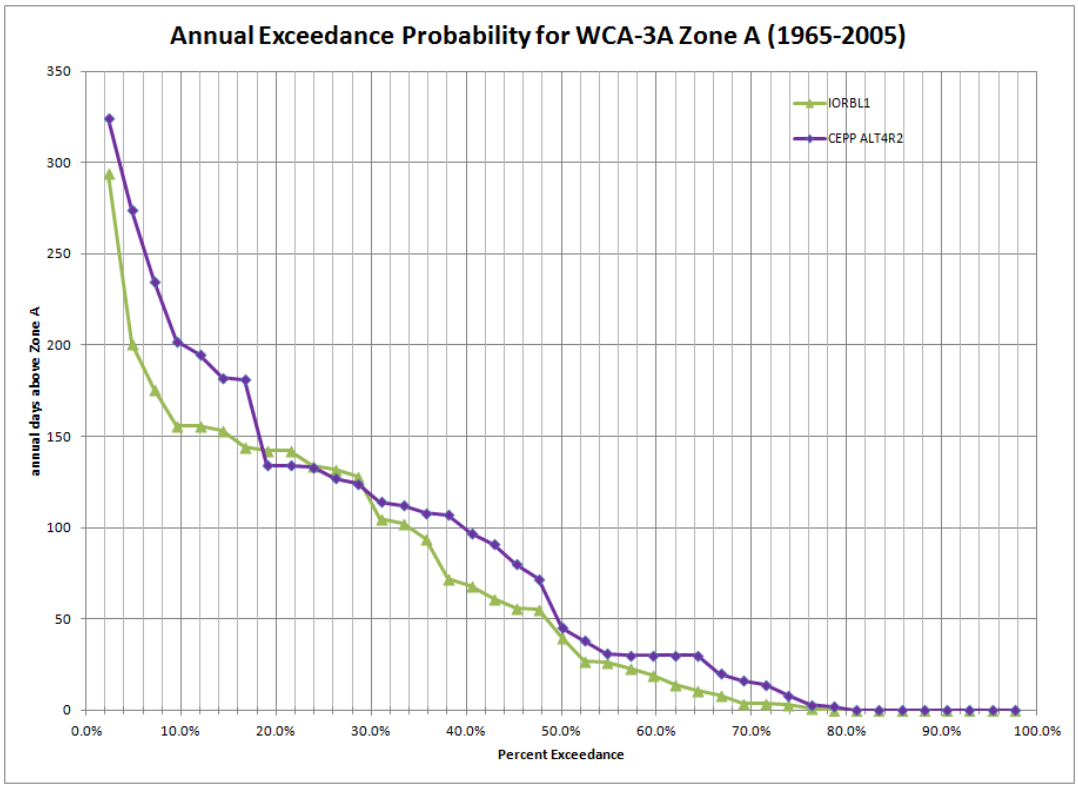

Figure B-37. WCA 3A Three-Gauge Average Probability Exceedance Curve for Annual Zone A Exceedance

The EN-W performance assessment for the final array of alternatives also included review of the WCA 3A stage hydrographs for individual years in which the number of days above Zone A increased by more than 20 percent between the CEPP FWO and any of the CEPP alternatives. Additional summary tables, annual hydrographs, and annual stage hydrograph statistical distribution plots are available in the CEPP PIR Engineering Appendix and the associated Hydrologic Modeling Annex A-2.

The detailed EN-W assessment of the frequency, duration, and peak stages of high water levels within WCA 3A concluded: (1) WCA 3A peak stages are lowered (these stages are most critical for WCA 3A design limitations); (2) the frequency and durations of Zone A exceedance are increased; (3) the increased frequency and durations occur during periods of the year when WCA 3A water levels are below peak critical levels; (4) CEPP infrastructure modifications (increased WCA 3A outlet capacity) and operations demonstrate that increased WCA 3A stages at the end of the dry season and start of the wet season can be effectively managed to avoid exacerbating high water conditions at the end of the wet season when Zone A levels off at 10.5 feet NGVD; and (5) CEPP infrastructure and operations utilized to achieve these performance levels need to be codified in the CEPP Project Operating Manual (POM). The requirements to maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the CEPP FWO (the IORBL1 performance is similar) were, therefore, successfully achieved based on EN-W assessment of the overall performance of the CEPP final array, including the TSP Alternative 4R2.

Concurrent with CEPP alternative formulation and modeling efforts, EN-W conducted a review of WCA 3B high water levels compared to the WCA 3B design criteria and independent of any previous SPF stage considerations. WCA 3B is currently bounded by the L-29 Levee (Section 3) to the south, the L-67A Levee and the L-67C Levee to the west, and the L-30 Levee to the east; the design grades for these WCA 3B perimeter levees range between 13.0 feet NGVD for the L-29 Levee (note: typical sections range from 13.5-17.5 feet NGVD, due to subsequent stockpiling of spoil material from L-29 Canal improvements, and all L-29 Section 3 Levee sections meet or exceed the design grade) to 20.0 feet NGVD for the L-30 Levee (the design grades for the L-67A and L-67C Levees are 17.5 and 12.5 feet NGVD, respectively), such that the L-29 Levee design grade represents the limiting factor for peak WCA 3B stages for CEPP. Stage duration curves (upper 25%) for the CEPP ECB, CEPP FWO (the IORBL1 performance is similar), and Alternative 4R2 are provided in the CEPP PIR Engineering Appendix for the two RSM-GL monitoring gage locations within WCA 3B at Site 71 and Shark-1 (also alternatively referred to as SRS-1) that are produced with the model standard output information; corresponding RSM-GL model GSE elevations for these gauges are 6.64 and 6.61 feet NGVD, respectively. For CEPP alternative 4R2, peak stages within WCA 3B (outside of the Blue Shanty Flow-way in Alternative 4R2) were 9.25 and 9.24 feet NGVD at Site 71 and Shark-1, respectively, or approximately 0.15-0.20 feet greater than the CEPP ECB/FWO baselines (9.05-9.06 feet NGVD) and the IORBL1 (9.08 feet NGVD); however, the WCA 3B peak stages for the CEPP TSP plan remains approximately 3.75 feet below the L-29 Section 3 design grade of 13.0 feet NGVD. The SPF rainfall for WCA 3B is approximately 1.5 feet (17.5 inches; based on the localized 3-day, 100-year maximum rainfall event of 14 inches). Based on EN-W assessment of these WCA 3B peak water depths less than 3 feet (2.61-2.63 feet peak depth for Alternative 4R2 stages), maximum wind and wave run-up potentials would not be expected to exceed 1-2 feet.

For this preliminary EN-W assessment of WCA 3B (further analysis will be conducted during PED), a presumed worst-case scenario was defined for the CEPP TSP plan, with peak Alternative 4R2 stages exacerbated by the additional SPF rainfall and maximum wind and wave run-up depths. Under this assumed worst-case scenario (9.25 feet NGVD stage + 1.5 feet SPF rainfall + 2.0 feet run-up potential), the L-29 Section 3 Levee would not be expected to be overtopped at the two lowest elevation points

(with approximately 0.25 feet of remaining freeboard, compared to the minimum L29 Section 3 Levee elevation of 13.0 feet NGVD). Given no predicted L-29 Section 3 Levee overtopping for this conservative assumed combination of events and recognition that CEPP inflows to WCA 3B (both within the Blue Shanty flow-way and eastern WCA 3B) will utilize controllable structures that may be closed in anticipation of extreme rainfall events, the EN-W preliminary assessment of the WCA 3B design criteria concluded that the proposed CEPP water levels of Alternative 4R2 would not adversely affect the flood control capability of the unmodified eastern segment of the L-29 Levee (or other perimeter levees, which have higher design elevations) bordering WCA 3B. Within the Blue Shanty flow-way, the peak stage with Alt 4R2 is 9.70 feet NGVD. The proposed L-67D Levee, which has a preliminary design elevation of 12.0 feet NGVD based on engineering design considerations (refer to Appendix A for additional details), would prevent the relatively higher stages within the Blue Shanty flow-way from further raising stages within eastern WCA 3B. The USACE currently anticipates revisiting the WCA 3B SPF stage during PED, pending final authorization of the CEPP and the establishment of operating criteria for WCA 3B water management structures for a System Operating Manual revision for CEPP implementation.

B.3.2.5 Agricultural and Urban Areas Located East of the East Coast Protective Levees

Of the six RSM-GL cells compared to the 1983–1993 calibration data (**Figure B-2**, the without project condition (IORBL1) and the existing condition baselines (2012EC and ECB), only cell 4328 has stages that warrant detailed attention; cell 4328 located between the C-103 and C-113 Canals, immediately east of the C-111 Canal. For the other five indicator cells (**Table B-1**), stages in the with project condition (Alt 4R2) are either the same or below the 1983-1993 calibration data, IORBL1, and 2012EC, or groundwater stages are more than two feet below ground at levels that would not affect crops. The stage duration curve for indicator cell 4328 (**Figure B-38**) for the with project condition (Alt 4R2) is essentially the same as the without project condition (IORBL1) during the wettest hydrologic conditions, up to the 20th percentile, with stages approximately 0.5 feet above the calibration values. Stages for cell 4328 are only slightly higher, by approximately 4 inches, between the 5th and 15th percentile when comparing the with project condition (Alt 4R2) to the existing condition baselines (2012EC and ECB). None of the simulated stages for the baselines or Alt 4R2 fall below the calibration data. Closer examination indicates that the stage is correlated to the adjacent C-111 Canal. In the RSM-GL model, final calibration of the Manning's coefficient (a roughness or resistance term) for the C-111 Canal resulted in selection of the maximum value (highest resistance) allowed under the calibration criteria. In general, selecting the extremes in the calibration range tends to lend less confidence in the results of the particular calibration parameter and, in this specific case, it is likely an indication that the C-111 Canal Manning's coefficient parameter was insensitive to conditions observed during the calibration period. Since the model performs well for the existing condition (2012EC) but shows high canal stages in the upstream reaches for the IORBL1 and Alt 4R2, the calibrated roughness coefficient is likely too high and the resulting upstream canal stages (and adjacent groundwater levels) are predicted higher by the RSM-GL than would be truly expected for the future with project conditions. This artifact of the model can only be addressed during model calibration and, in this specific case, should not be evaluated as representative of the predicted project performance.

Comparison of the regional groundwater stage map can identify where systemically higher groundwater levels, which may adversely impact flood protection, may occur. The October 1995 map was selected to determine if the CEPP project affected groundwater levels when regional ground water levels are most likely to rise. The month of October typically has the highest rainfall of the year, and 1995 is one of years with the highest wet season rainfall in the period of simulation. The with project condition (Alt 4R2) and

the without project conditions (IORBL1) were compared. The 1995 regional water levels are generally maintained (grey shading) or flood protection slightly improved (lower levels – white and yellow shading) for LECSA 2 and LECSA 3 (**Figure B-39)**. With project (Alt 4R2) stages are increased by less than 0.25 feet for some areas east of the 8.5 SMA detention cell, the C-111 South Dade North Detention Area, and the C-111 South Detention Area, which are operating at higher stages for Alt 4R2 to manage increased seepage during this period. When comparing the with project condition (Alt 4R2) to the existing condition baselines (2012 EC and ECB) (**Figure B-40** and **Figure B-41**), stages near the Broward County Water Preserve Area Project in LECSA 2 increase consistent with that project's purpose. Groundwater stages east of Pennsuco in LECSA 3 decrease between 0.10 and 0.25 ft. Further south, in the vicinity of the SDCS within LECSA 3, groundwater stages increase between 0.1 and 0.5 ft when comparing Alt 4R2 to the 2012EC/ECB. This is consistent with the simulated higher seepage rates along L31N and L31W (**Table B-9**) and shows the effects of intervening projects assumed for the CEPP future without condition.

The stage duration curves for the LEC canals adjacent to WCA 3B and ENP and selected monitoring gauges throughout the LEC were also assessed as part of the Savings Clause flood protection evaluation. The stage duration curves for these canals and gauges do not indicate significant increased stages within the upper 10 percentile, which was assumed as a representative indicator of potential increased flood protection risk. Compared to the IORBL1 and the ECB/2012EC, L-30 Canal stages (north of S-335) for Alt 4R2 indicate a moderate reduction of 0.1-0.2 feet to flood control stages within the wettest 10% of hydrologic conditions, with no significant change observed for the upper 1% of the stage duration curve (**Figure B-42**). The L-31N Canal stages (north of G-211) indicate a significant (up to 1.0 feet) reduction to flood control stages within the wettest 5% of hydrologic conditions for Alternative 4R2 (**Figure B-43**). C-111 Canal stages between S-176 and S-18C indicate no significant change for the upper 10% of the stage duration curve compared to the IORBL1, with a small stage reduction of 0.1 feet observed compared to the ECB (**Figure B-44**).

G-3439, a monitored well located along the C4 Canal, was also evaluated (**Figure B-45**). The with project condition (Alt 4R2) performs the same as the without project condition (IORBL1) during the highest 20 percent of the period of simulation. Comparison of the with project to the existing condition baselines (2012EC and ECB) shows the water stages slightly reduced with Alternative 4R2.

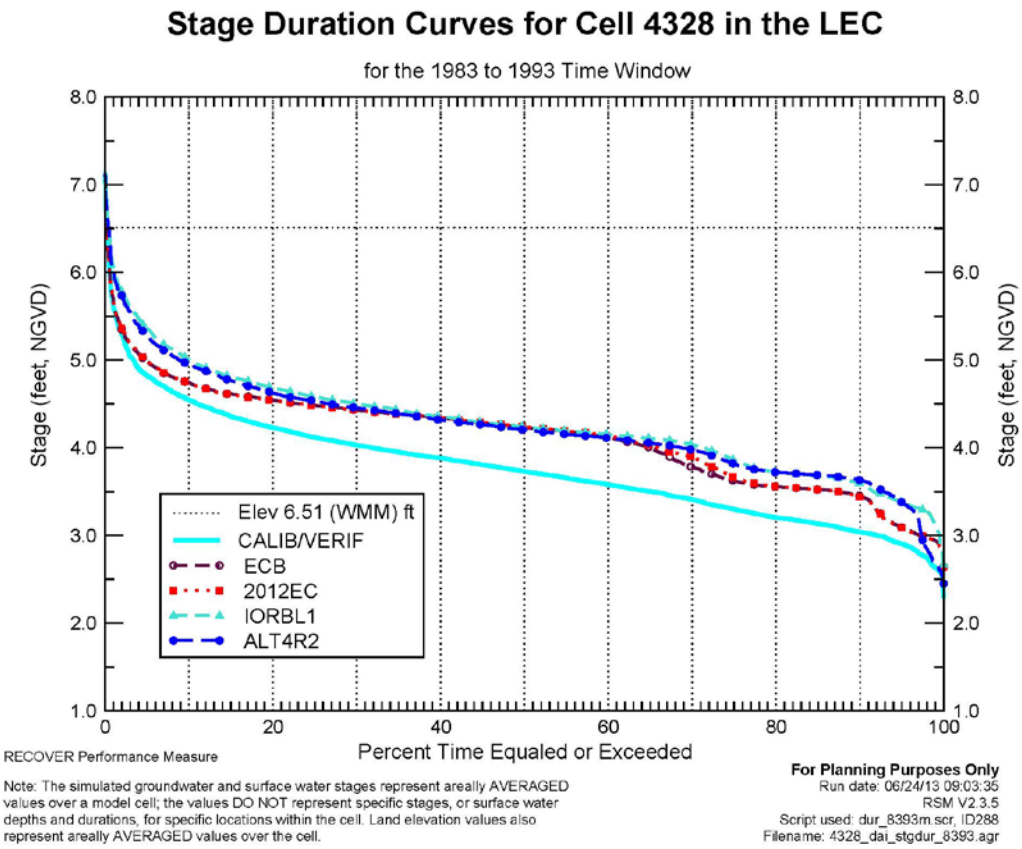

Figure B-38. Stage Duration Curves for Cell 4328 in the LEC showing anomalous results

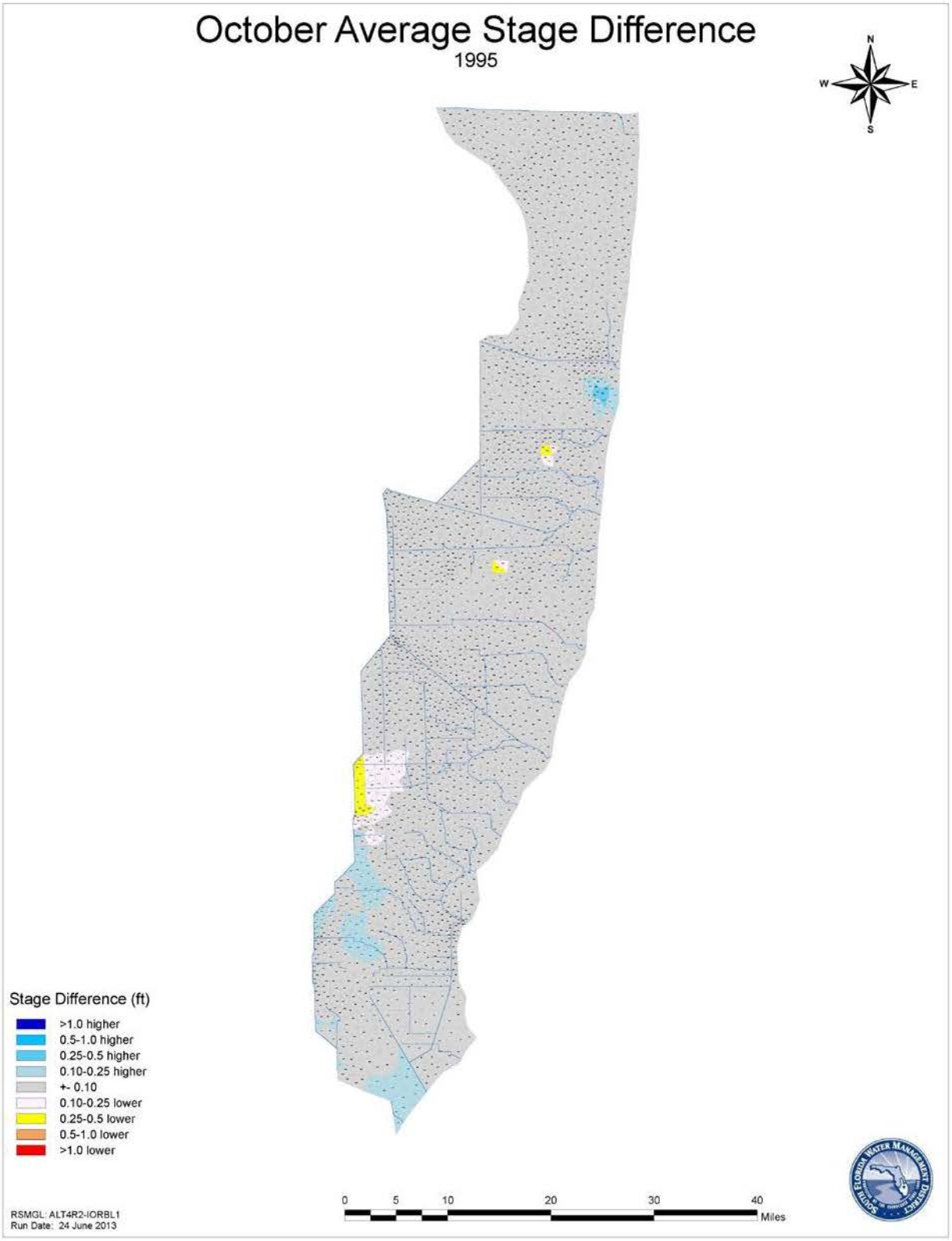

Figure B-39. October 1995 Average Stage Difference between Alt 4R2 and IORBL1

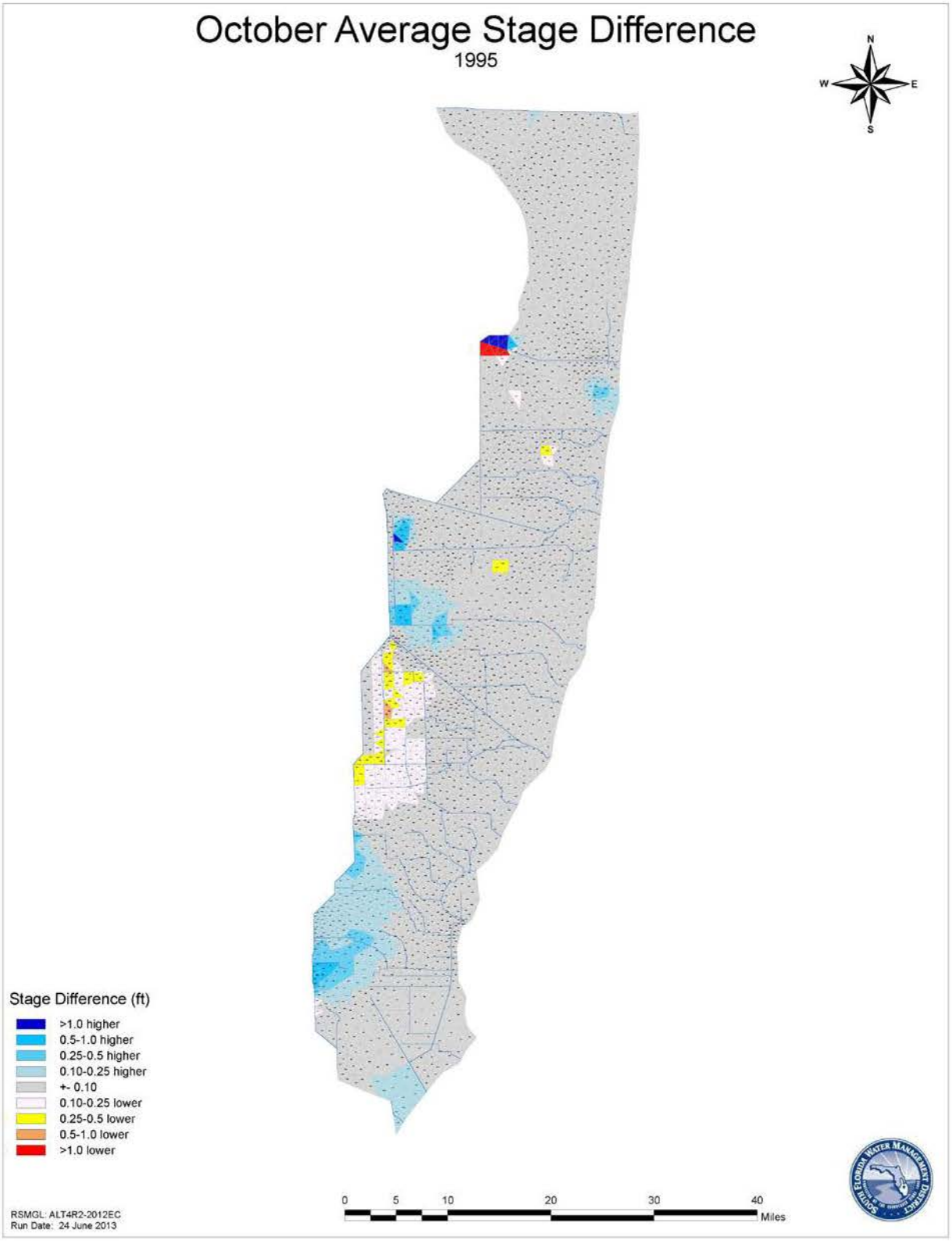

Figure B-40. October 1995 Average Stage Difference between Alt 4R2 and 2012EC

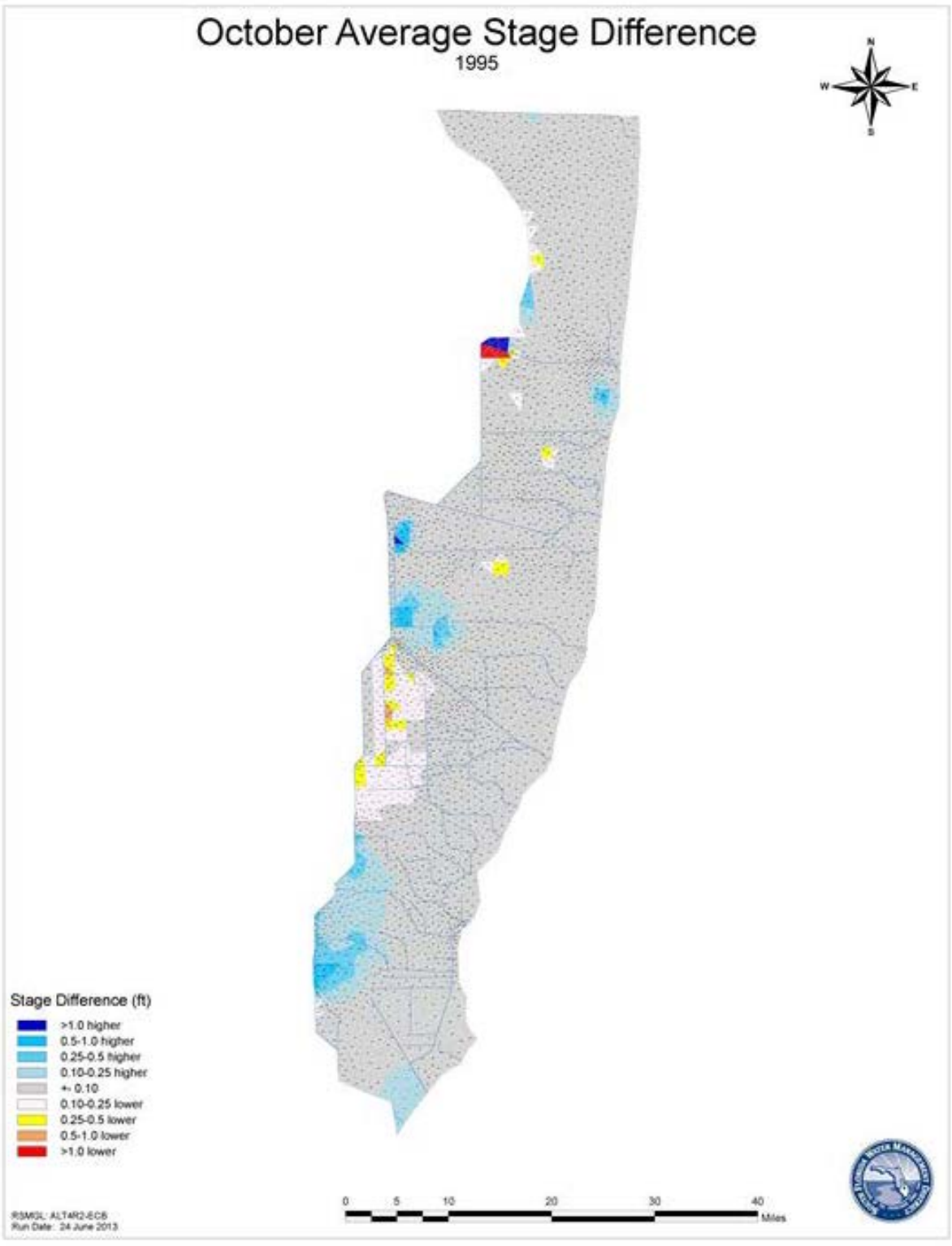

Figure B-41. October 1995 Average Stage Difference between Alt 4R2 and ECB

Table B-9. Groundwater Seepage under the East Coast Protective Levee to the LECSA 3

Seepage Direction	Levee Seepage from Marsh Cell (kAF)				
	ECB	2012EC	IORBL1	ALT4R	ALT4R2
L30 north of the bridge	218	215	211	203	201
L30 between S335 and the bridge	111	111	106	141	141
L30 south of S335	92	92	84	98	100
L31N north of G211	149	171	160	211	251
L31N from G211 to S331	29	29	30	28	28
L31N from S331 to S176	209	207	227	329	322
C111 from S176 to S177	98	107	201	217	214
C111 from S177 to S18C	29	30	44	49	47

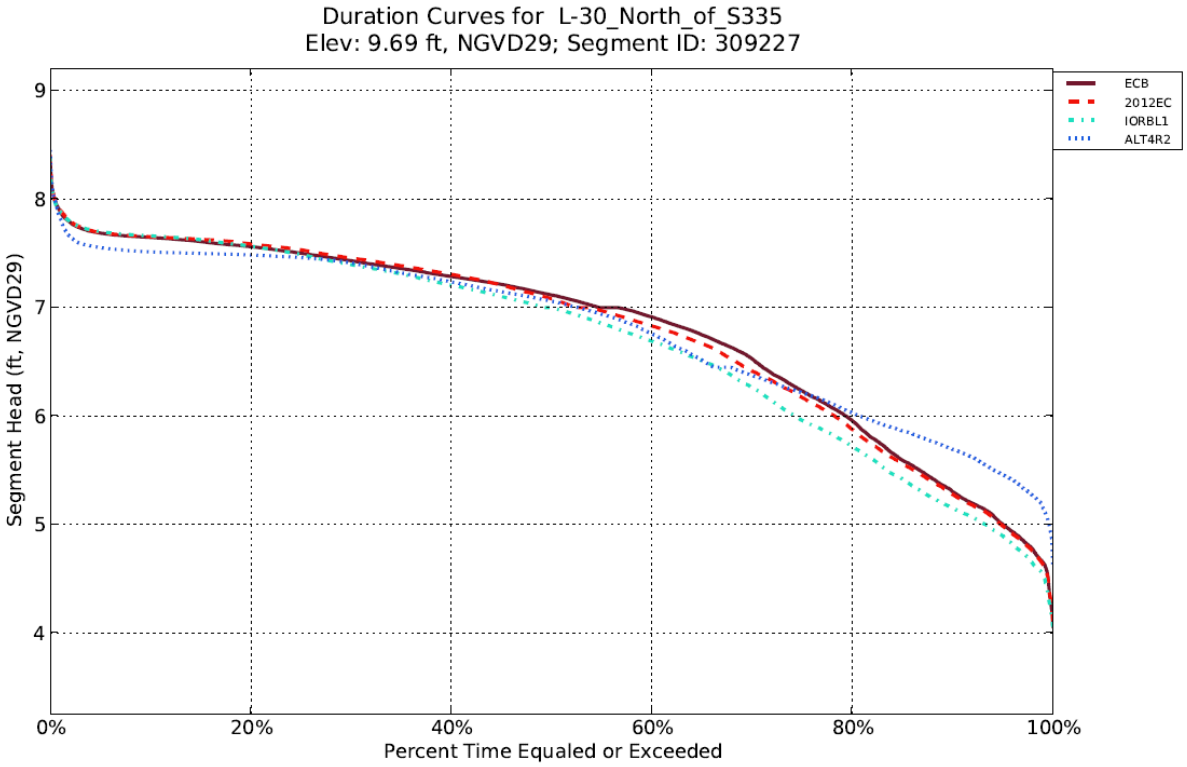

Figure B-42. Duration Curves for L-30 Canal, adjacent to WCA 3B

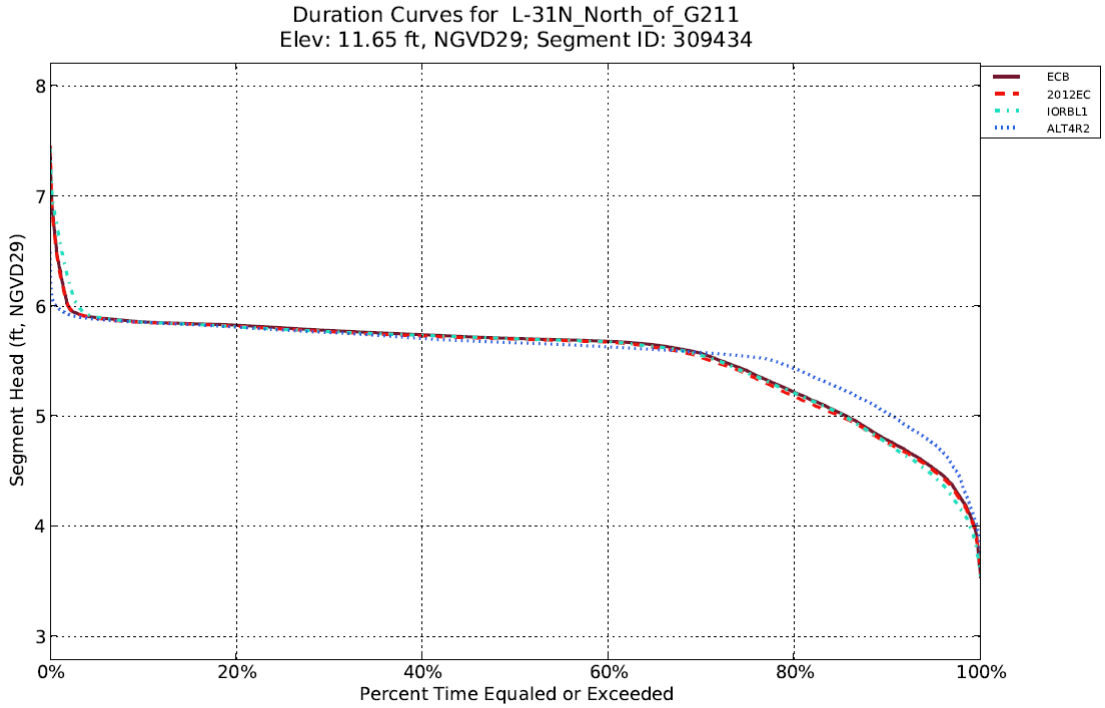

Figure B-43. Duration Curves for L-31 N Canal, Adjacent to Northern ENP

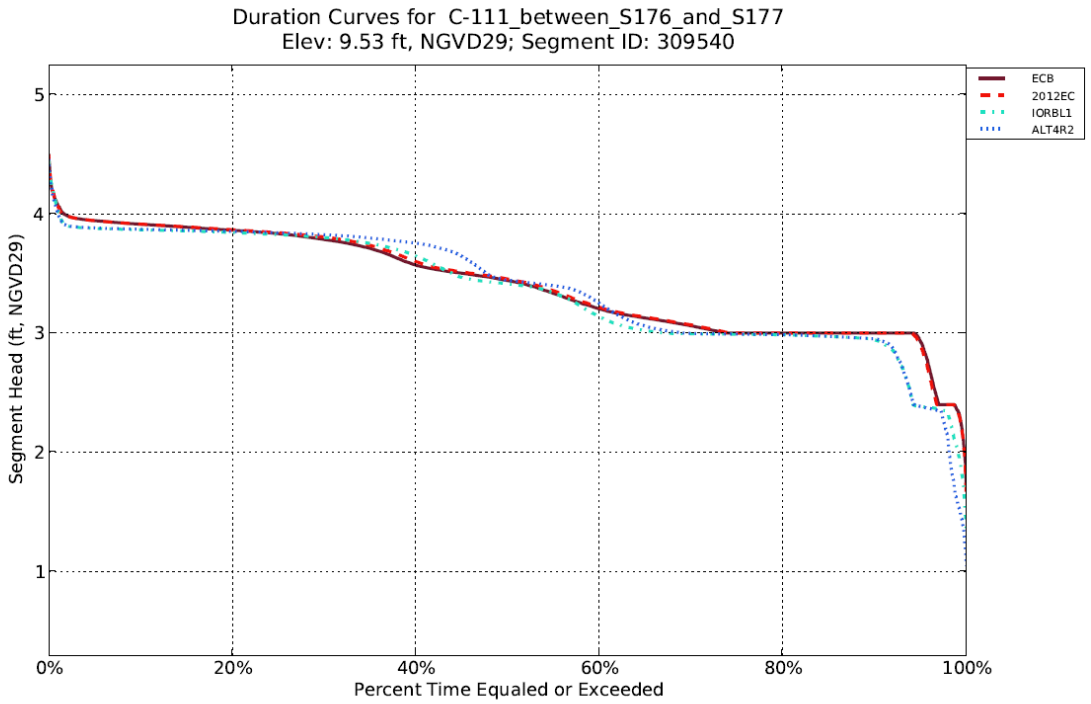

Figure B-44. Duration Curves for C-111 Canal, Adjacent to Southern ENP

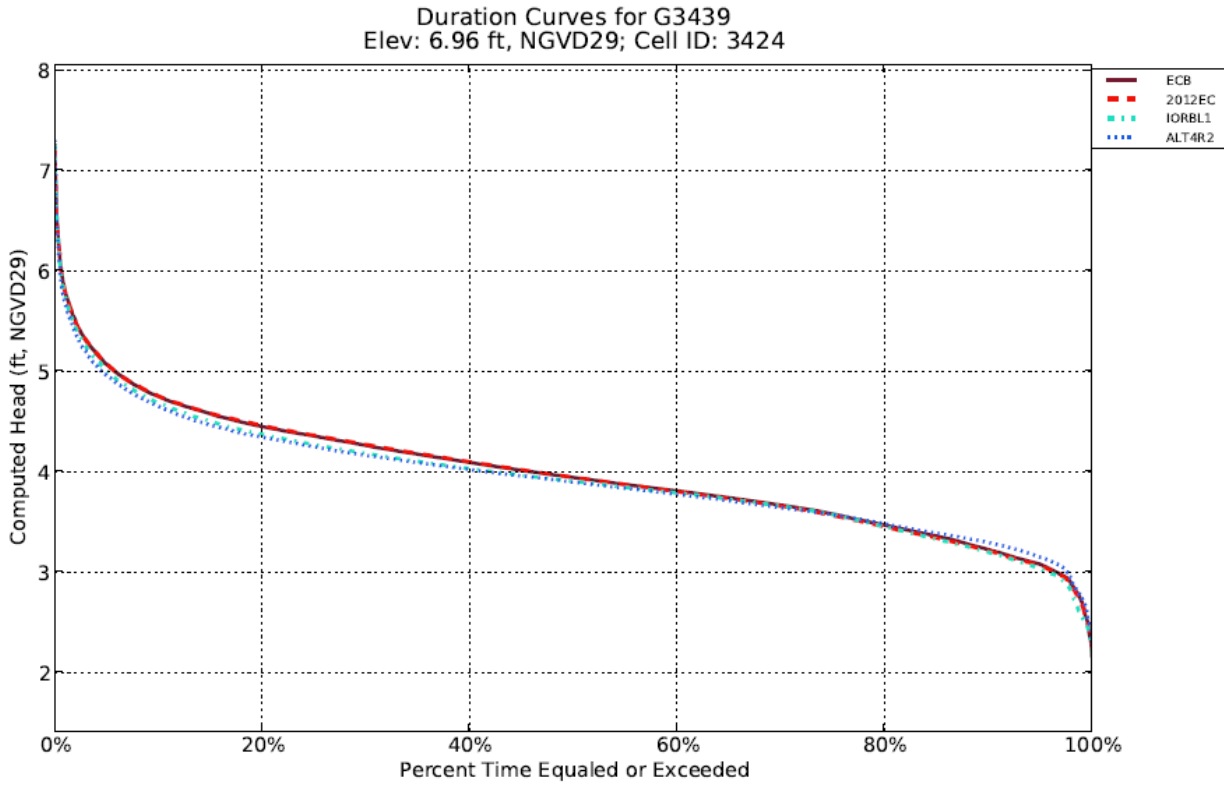

Figure B-45. Stage Duration Curves for G-3439

B.3.2.6 Seminole Indian Tribe of Florida

CEPP deliveries to northern WCA 3A will benefit the Tribe's hunting, fishing, trapping and frogging rights (1987 Tribe and State of Florida Settlement Agreement) along the approximate 14,720 acres on the NW corner of the WCA 3A. As a result of reduced freshwater inflow and drainage by the Miami Canal, northern WCA 3A is currently dominated largely by mono-specific sawgrass stands and lacks the diversity of communities in central and portions of southern WCA 3A. Implementation of any of the CEPP action alternatives is expected to rehydrate much of northern WCA 3A by redistributing treated STA discharges from the L-4 and L-5 Canals north of WCA 3A in a manner that promotes sheetflow and by removing the drainage effects associated with the Miami Canal. Compared to the FWO, Alt 4R and Alt 4R2 stages immediately west of the L-28 Levee are increased by 0.1-0.2 feet under wet to normal hydrologic conditions and increased by 0.2-0.3 feet under normal to dry hydrologic conditions, with no significant change indicated for extreme wet or dry conditions. Stage increases are only observed for the RSM-GL cells located immediately west of the L-28 Levee, which correspond to the areas approximately 1-2 miles west of L-28. Average annual hydroperiods for the southernmost cells within the Seminole Big Cypress Reservation are increased by 10 to 60 days with Alt 4R and Alt 4R2 (FWO hydroperiods range from 25-150 days), with no significant hydroperiod changed indicated for the northernmost cells 2-3 miles south of L-4 (FWO hydroperiods range from 0-15 days) .

Resumption of sheetflow and related patterns of hydroperiod extension and increased water depths will significantly help to restore and sustain the micro-topography, directionality, and spatial extent of ridges and sloughs and improve the health of tree islands in the ridge and slough landscape. Although none of the alternatives would provide the necessary inundation pattern for complete slough vegetation restoration, all alternatives act to rehydrate northern WCA 3A, promoting peat accretion, reducing the potential for high intensity fires and promoting transition from upland to wetland vegetation.

B.3.2.7 Miccosukee Tribe of Indians of Florida

All of the CEPP alternatives show marked improvement in hydroperiod and hydropatterns in northwestern WCA 3A. Resumption of sheetflow and related patterns of hydroperiod extension and increased water depths will significantly help to restore and sustain the micro-topography, directionality, and spatial extent of ridges and sloughs and to improve the health of tree islands in the ridge and slough landscape. Although none of the alternatives would provide the necessary inundation pattern for complete slough vegetation restoration, all alternatives act to rehydrate northern WCA 3A, promoting peat accretion, reducing the potential for high intensity fires, and promoting transition from upland to wetland vegetation.

All CEPP alternatives result in similar patterns of rehydration within northern WCA 3A and all significantly decrease the amount of time when this region experiences dryout conditions. Gauge 3A-3 in northeastern WCA 3A, used to track droughts, indicates that with the FWO this area will continue to experience water levels below ground 25-30% of the time and that water depths will exceed three feet approximately 1-2% of the time. Tree islands are connected to the surrounding peat marshes via the roots of the trees. Although tree roots are still receiving water from wicking within the peat (unless the tree island is rocky), when the water table drops below these roots, the microclimate of these islands gets too dry and they can burn. All CEPP action alternatives create the hydrology necessary to restore tree islands and reduce the potential for devastating fires. Rehydration of northern WCA 3A is expected to prevent further tree island degradation and peat fires, and set in motion trends to restore ridge-slough-island patterns. With all CEPP action alternatives, northern WCA 3A will no longer have extremely short hydroperiods. Instead, this area will have more spatially uniform hydroperiods that vary between 120 and 240 days.

Compared to the FWO, Alt 4R2 stages immediately west of the L-28 Levee (north of I-75) are increased by 0.1-0.2 feet under wet to normal hydrologic conditions and increased by 0.2-0.3 feet under normal to dry hydrologic conditions, with no significant change indicated for extreme wet or dry conditions. Stage increases are only observed for the RSM-GL cells located immediately west of the L-28 Levee, which correspond to the areas approximately 1-2 miles west of L-28. Average annual hydroperiods for these cells within the Miccosukee Indian Reservation, north of Interstate 75, are increased by 10 to 60 days with Alt 4R2 (FWO hydroperiods range from 25-150 days), with no significant hydroperiod changed indicated for the 2-3 miles south of L-4 (FWO hydroperiods range from 0-15 days) .

Although Alt 4R2 does not include modifications to the L-28 Levee or the adjacent canal south of I-75, stages within the L-28 Triangle are slightly increased by 0.1-0.2 feet during nearly all hydrologic conditions, with no stage increases indicated during extreme wet hydrologic conditions, due to groundwater interactions with the down-gradient western WCA 3A marsh. Within central WCA 3A (3A-4), stages are generally increased by 0.1-0.2 feet during average to dry conditions with Alt 4R2, with a slight depth reduction during the wettest 10% of conditions and no significant change during extreme dry conditions. Southern WCA 3A (3A-28) stages for Alt 4R2 are decreased by 0.1-0.2 feet during the

wettest 5% of conditions and slightly decreased during normal to dry conditions. This information has been provided to representatives of the Tribe through PDT meetings and additional individual meetings with representatives of the Tribe.

For Alt 4R2, WCA 3B stages at Site 71 are increased under all hydrologic conditions, including stage increases of 0.1 feet during the upper 20% of the stage duration curve, stage increases of 0.2-0.3 feet for normal to dry conditions, and a slight stage increase during extreme dry conditions. The peak stage within the Blue Shanty flow-way is 9.70 feet NGVD and stages exceed 8.0 feet NGVD for approximately 45% of the period of simulation.

Compared to the FWO, Alt 4R2 stages within northwest ENP are generally significantly decreased by 0.1-0.3 feet under both wet and dry hydrologic conditions; stages are slightly increased or unchanged from the FWO for normal hydrologic conditions between approximately 35% and 55% on the stage duration curve. To the south and west, the NP-205 monitoring gage indicates a potentially significant stage decrease of 0.1-0.2 feet under all hydrologic conditions for all alternatives, compared to the FWO (**Figure B-46**).

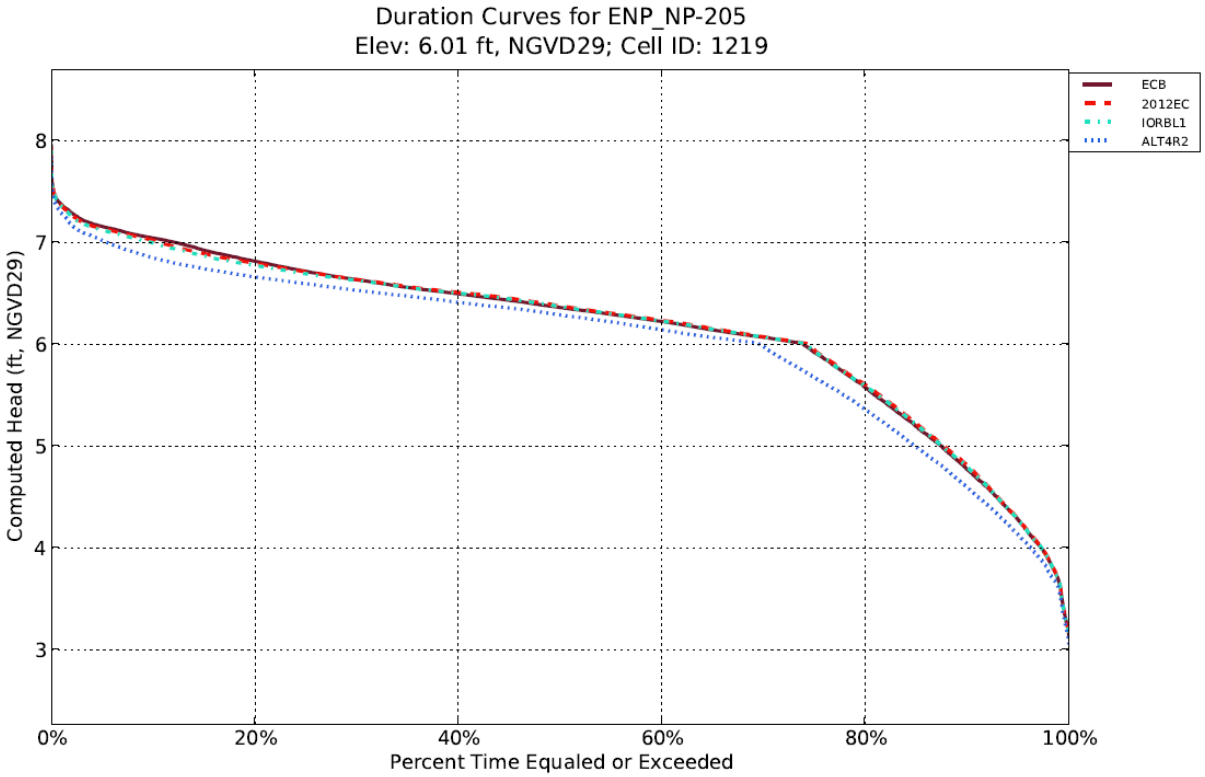

Figure B-46. Stage Duration Curves for ENP NP-205

B.3.3 Project Assurances – Identification of Water Made Available by the Project

The total water and the water made available for the natural system and other-water related needs are quantified when all project features are constructed and the project is expected to be operational as identified in the with project condition, Alt 4R2. The pre-project water expected to be available when the project is operational is represented by IORBL1.

B.3.3.1 Natural System

The total water made available by the CEPP project is represented by the with project condition, Alt 4R2. The pre-project water in the system, including the other CERP projects assumed in place prior to CEPP implementation, is represented by the IORBL1 model simulation. The difference between these two conditions represents the water made available by the project (Alt 4R2 minus IORBL1). To follow the habitat unit benefits calculated during plan formulation, three spatial locations were selected: the inflows to WCA 3 (along the formulation redline), inflows to ENP, and overland flows to Florida Bay. Surface water inflows along the redline to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the ECB, 2012EC, and IORBL1 base conditions; for Alternative 4R2, the combined flows from the S-8 pump station discharges to the Miami Canal and discharges to the S-8A gated culvert (which diverts water to the L-4 Levee degrade gap) are included in addition to S-150 and STA-5/STA-6 outflows to WCA 3A. Quantification of flows into WCA 3 can be found in **Figure B-47**.

The water made available with CEPP is a difference between the future without base condition (IORBL1) and future with project (Alt 4R2). Although there is a progressive reduction to the incremental increased inflows to WCA 3A with Alt 4R2 from 90th to the 50^{th} percentile and again from the 50th to the 10^{th} percentile, the lift from the baseline to the with project condition does not necessarily increase in the same way across the distribution.

Inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G; Alternative 4R2 only) and S-356 (Alternative 4R2 only). Quantification of flows into ENP can be found in **Figure B-48** Overland flows to Florida Bay are quantified for RSM-GL Transect 23 (southeast ENP; transects 23-A, 23-B, and 23-C combined) and Transect 27 (Central Shark River Slough) (**Figure B-49** and **Figure B-50)**.

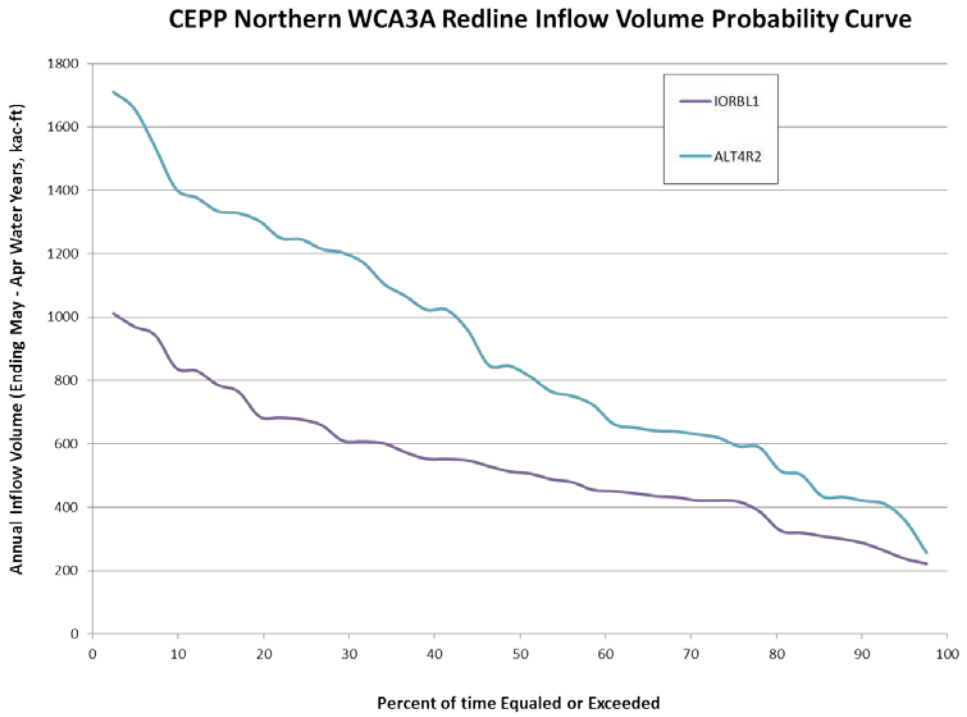

Figure B-47. CEPP Northern WCA 3A Redline Inflow Volume Probability Curve for IORBL1 and Alt 4R2

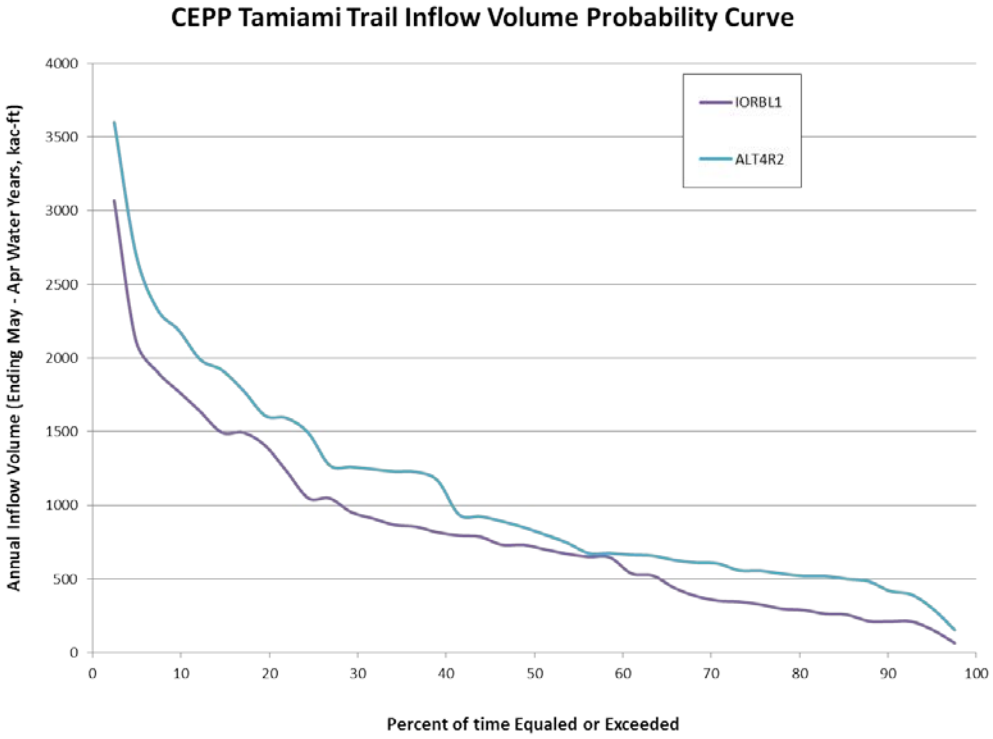

Figure B-48. CEPP Tamiami Trail Inflow Volume Probability Curve for IORBL1 and Alt 4R2

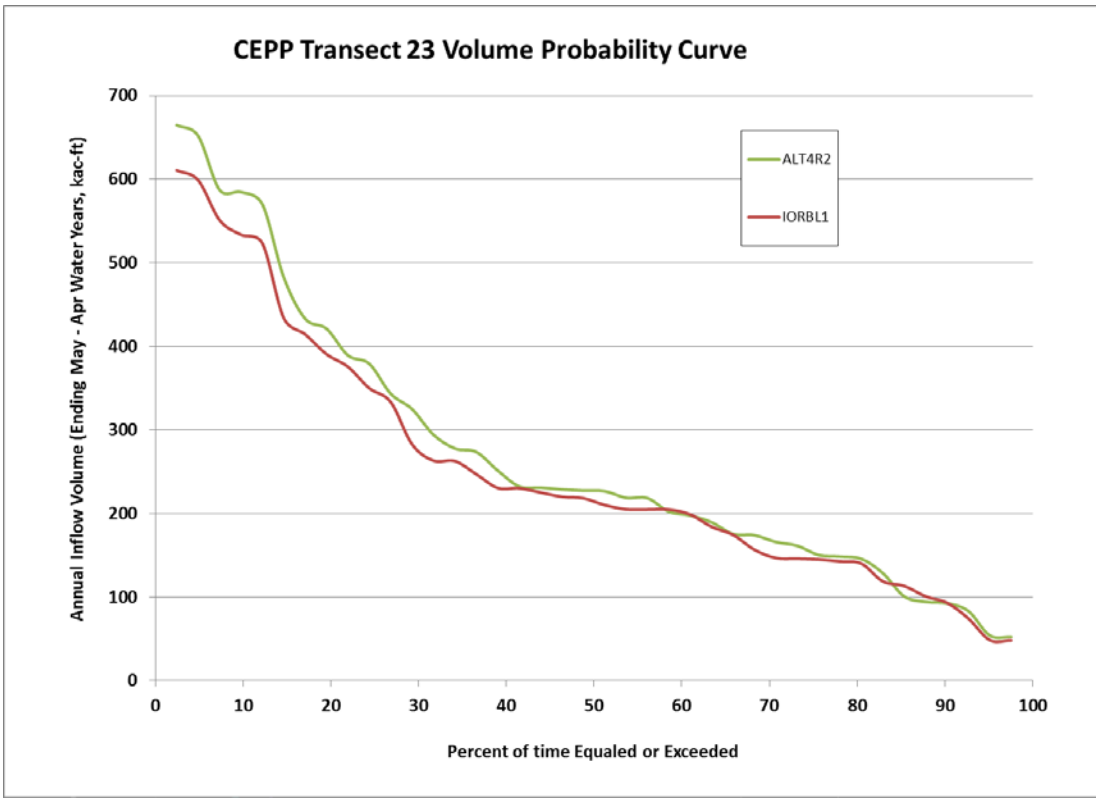

Figure B-49. CEPP Transect 23 Volume Probability Curve

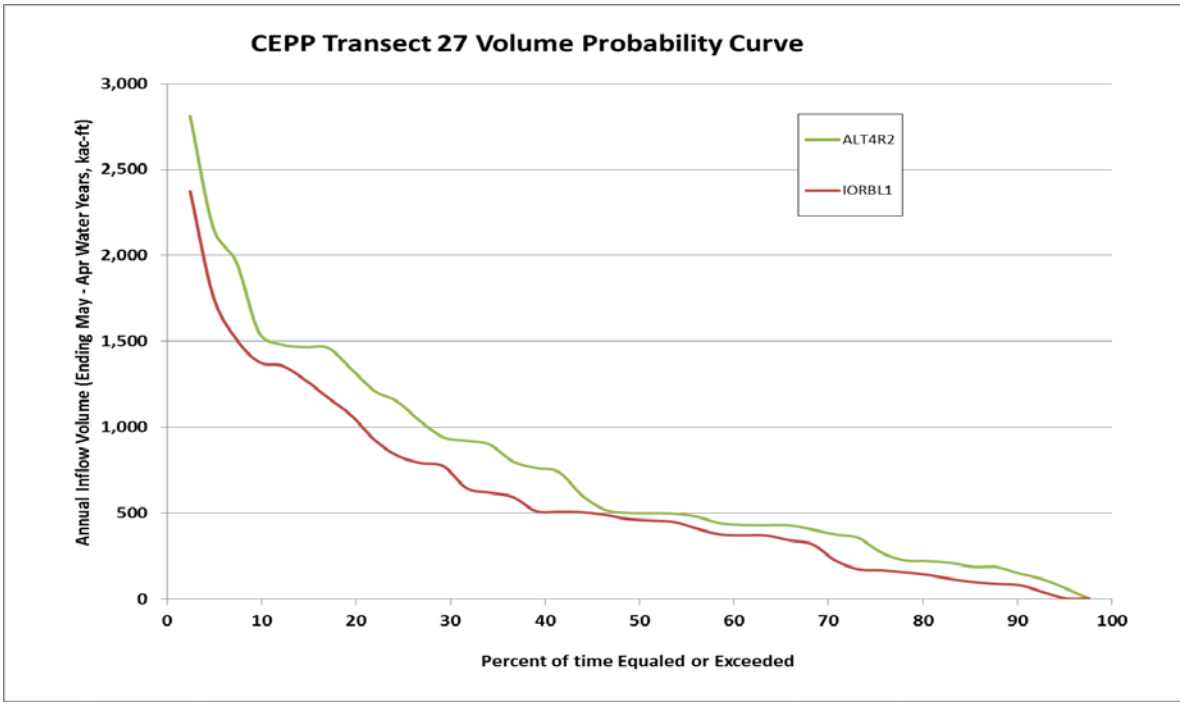

Figure B-50. CEPP Transect 27 Volume Probability Curve

B.3.3.2 Water for Other Water Related Needs

The CEPP components do not directly provide water to meet other water-related needs in LOSA, LECSA 2, or LECSA 3. By virtue of additional water being stored in Lake Okeechobee, additional water may reach water users located in LOSA; however, the level of service for LOSA water supply has not improved, nor has it been degraded by CEPP. Therefore, no water was quantified for other water related needs in the LOSA for this project.

For LECSA, additional water has been made available by the project in the regional system and has been quantified for LECSA 2 and LECSA 3. An increased demand of 12 million gallons per day (MGD) in LECSA 2 and 5 MGD in LECSA 3 was included in Alt 4R2 above the demands in the initial operating regime baseline (IORBL1); the public water supply demands assumed for the IORBL1 are also equivalent to the demands assumed for the ECB and 2012EC existing condition baselines (on average, 277 MGD in LECSA 2 and 412 MGD in LECSA 3). This increase in demands for other water related needs could be met without affecting the benefits accrued in the natural system.

B.4 Conclusions

B.4.1 Savings Clause - Elimination or Transfer of Existing Legal Sources of Water

Sources of water to meet agricultural and urban demand in the LOSA and LECSAs will continue to be met by their current sources, primarily Lake Okeechobee, the Everglades (including the WCAs), surface water in the regional canal network, and the surficial aquifer system. Sources of water for the Seminole Tribe of Florida and Miccosukee Tribe of Indians are influenced by the regional water management system (C&SF Project, including Lake Okeechobee) but will not be affected by the CEPP project. In addition, water supplies to ENP exceed future without project and existing condition baseline volumes, and water sources for fish and wildlife will not be diminished. Therefore, there will be no elimination as a result of the CEPP project on existing legal sources of supply for the following:

- Agricultural or urban water supply
- Allocation or entitlement to the Seminole Indian Tribe of Florida under Section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e)
- The Miccosukee Tribe of Indians of Florida
- Water supply for ENP
- Water supply for fish and wildlife

A small portion of water utilized by agricultural users from Lake Okeechobee will be transferred as a result of the project. Included in the CEPP Alt 4R2 operations is utilization of the IRL-S project C-44 Reservoir to backflow water to Lake Okeechobee when stages in the C-44 Canal permit. Typically water is backflowed from C-44 Canal when stages in Lake Okeechobee fall below the Baseflow sub-band as identified in LORS 2008. The operations of the CEPP Alt 4R2 expand on this concept to backflow water captured in the C-44 Reservoir including water conveyed from the C-23 Canal and Basin. The additional volume of water backflowed from the C-44 Reservoir averages 21.3 kAF on an annual basis, the difference between Alt 4R2 and IORBL1 (37.6 kAF and 16.3 kAF, respectively). Although Lake Okeechobee would continue to be the source of water for agricultural users within LOSA, this operational change is considered a partial water supply source transfer since the C-44 Reservoir does not contribute to Lake inflows in the without project in place.

More important is the dependency on the Lake Okeechobee Regulation schedule modifications to enable CEPP-proposed conveyance of water to the CEPP FEB, then to WCA 3 for hydrologic improvements to the Everglades. The water retained in Lake Okeechobee also maintains the level of service for water supply for existing legal users dependent on Lake Okeechobee and its connected conveyance system. Specifically, this includes the agricultural users in LOSA and the Seminole Indian Tribe of Florida.

B.4.2 Savings Clause – Flood Protection

Implementation of the project will not reduce the levels of service for flood protection within the areas affected by the project, including LOSA, EAA, LECSA 2, and LECSA 3. However, one area in the South Dade Conveyance System, specifically located adjacent to C-111 Canal, has shown increased stages relative to the existing base conditions simulated in the RSM. Since the model performs well for the existing condition (2012EC), but shows high canal stages in the upstream reaches for the IORBL1 and ALT 4R2, the calibrated roughness coefficient is likely too high and the resulting upstream canal stages (and adjacent groundwater levels) are predicted higher than would be truly expected for the future conditions. This artifact of the model can only be addressed during model calibration, and in this specific case should not be evaluated as representative of the predicted project performance.

Implementation of the project will not reduce the levels of service for flood protection within the areas affected by the project including the Seminole Indian Tribe of Florida's Big Cypress Reservation. Implementation of the project will not reduce the levels of service for flood protection within the areas affected by the project including the Miccosukee Tribe of Indians of Florida's reservations and resort.

The CEPP plan formulation process assumed that the pre-project flood protection level of service for the EAA would be maintained under CEPP by providing the same total pumping capacity at the S-8 (4,170 cfs) and S-7 (2,490 cfs) pump stations, which provide drainage for the upstream EAA basin. CEPP will maintain this existing design capacity for the S-8 complex through a combination of pump station design modifications, a new hydraulic connection from S-8 to the degraded L-4 Levee, utilization of the existing G-404 pump station (570 cfs design capacity), and leaving the 1-2 mile segment of the Miami Canal as available getaway conveyance capacity during peak flow events. Modifications of the S-8 pump station complex for CEPP operations will be further analyzed during the PED phase of CEPP, including confirmation that CEPP construction and implementation sequences will not adversely impact the pre-project level of service for flood protection within the EAA.

B.4.3 Project Assurances - Identifying Water for the Natural System

The volume of water at the 10^{th}, 50^{th}, and 90^{th} percentile was extracted from the RSM-GL simulation data applied to develop the volume probability curves at the three specified locations in the regional system: inflows to WCA 3 (along the formulation redline), inflows to ENP, and overland flows to Florida Bay. The pre-project available water (IORBL1), the with project total water available (Alt 4R2), and the water made available by the project (differences between Alt 4R2 and IORBL1) for the natural system can be found in **Tables B-10** through **B-12**.

Table B-10. Pre-Project Volume of Water (kAF/yr) Available for the Natural System

Pre-Project Water (IORBL1)			
Location	***Water made available equaled or exceeded 10% of the time***	***Water made available equaled or exceeded 50% of the time***	***Water made available equaled or exceeded 90% of the time***
WCA 3	839	513	286
ENP	1,771	732	212
Florida Bay	1,912	685	174

Table B-11. Total Volume of Water (kAF/yr) Available for the Natural System

Total Water (Alt 4R2)			
Location	***Water made available equaled or exceeded 10% of the time***	***Water made available equaled or exceeded 50% of the time***	***Water made available equaled or exceeded 90% of the time***
WCA 3	1,404	846	420
ENP	2,187	850	419
Florida Bay	2,132	730	241

Table B-12. Water Made Available by the Project (kAF/yr) for the Natural System

Water Made Available by the Project (difference between Alt 4R2 and IORBL1)			
Location	***Water made available equaled or exceeded 10% of the time***	***Water made available equaled or exceeded 50% of the time***	***Water made available equaled or exceeded 90% of the time***
WCA 3	564	333	134
ENP	416	118	207
Florida Bay	220	45	67

B.4.3.1 Water to be Reserved or Allocated for the Natural System

As required by Section 601(h)(4)(A) of the of the Water Resources Development Act of 2000 and Section 385.35 of the Programmatic Regulations for the Implementation of CERP, the water made available by the project will be protected using the State of Florida's reservation or allocation authority under state law as in represented by **Table B-12**. The SFWMD has protected the pre-project water for the natural system in the Holeyland and Rotenberger Wildlife Management Areas; WCA 1, WCA 2A, WCA 2B, WCA 3A, and WCA 3B; and ENP through the Restricted Allocation Area Rule for the Everglades and North Palm Beach/Loxahatchee River Watershed Waterbodies. Refer to Section 3.2.1 of the SFWMD's Basis of Review for Water Use Permit Applications (2012) for additional information. The combination of protecting the pre-project water and protecting the water made available by the CEPP project features is required for the CEPP to achieve its intended benefits.

The SFWMD will protect the water made available by the CEPP project features using its reservation or allocation authority as required by 373.470, Florida Statutes (F.S.). Protection of water made available by CEPP project features is required in order for the SFWMD and the Department of the Army to enter into one or more Project Partnership Agreements to construct the CEPP project features.

B.4.4 Project Assurances – Identifying Water Made Available for Other Water Related Needs

The CEPP components do not directly provide water to meet other water related needs in LOSA, LECSA 2, or LECSA 3. By virtue of additional water being stored in Lake Okeechobee, additional water may reach water users located in LOSA; however, the level of service for LOSA water supply has not improved, nor has it been degraded by CEPP. Therefore, no water was quantified for other water related needs in the LOSA for this project.

Additional water available for allocation to consumptive use permit applicants is expected to be generated by this project in LECSA 2 and LECSA 3. The specific locations, volumes, and/or timing of where this water will be available for withdrawal will be developed when the following, project-related conditions are met: 1) completion of all CEPP project features and 2) upon a formal determination by the SFWMD's Governing Board that these project features are operational consistent with requirements of the CEPP PPA. The following steps must be complete prior to this determination: 1) CEPP project authorization by Congress; 2) appropriation of federal and state funding; 3) Project Partnership Agreement(s) for construction of CEPP features; 4) construction of CEPP features; and 5) operational testing and monitoring of CEPP features. Water will be allocated in accordance with the requirements of the SFWMD's consumptive use permitting rules in effect at that time. Other future state or federal initiatives may make additional water available for consumptive use in addition to this CERP increment. Potential consumptive use permit applicants may, at their discretion, evaluate whether or not this additionally available water is a suitable source to meet their needs.

B.4.5 Incremental Analysis during Plan Implementation

The TSP is composed of implementation phases that include the construction of a recommended plan feature or logical groupings of recommended plan features, agreed upon by the USACE and SFWMD, that maximize benefits to the extent practicable consistent with project dependencies and the Adaptive Management and Monitoring Plan. These implementation phases will achieve incremental hydrologic and environmental benefits. CEPP will be designed and constructed in phases, which each construction phase containing one or more implementation phases as described in **Section 6** of the PIR main report. The approach incorporates the adaptive management process, maximizing the opportunity to realize incremental restoration benefits by initially building features that utilize pre-project available water in the system which meets State water quality standards. The USACE and the SFWMD will select particular implementation phases and the sequence of project features to maximize benefits to the extent practicable and consistent with the Adaptive Management and Monitoring Plan (See Annex D). The Corps and the District will undertake updated project assurances and savings clause analyses for the implementation phases that are selected to be included in a Project Partnership Agreement or amendment thereto prior to entering into the PPA or PPA amendment.

B.4.6 Project Assurances Commitments for All CERP Projects

The overarching objective of the CERP (referred to as simply the "Plan" in WRDA 2000 and the Programmatic Regulations) is the restoration, preservation, and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The federal government and the State of Florida are committed to the protection of the appropriate quantity, quality, timing, and distribution of water to achieve and maintain the benefits to the natural system described in CERP. As envisioned in WRDA 2000 and the Programmatic Regulations,

each PIR will identify this appropriate quantity, quality, timing, and distribution of water for the natural system.

The following language sets forth these commitments:

> *The overarching objective of the Plan is the restoration, preservation, and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Federal Government and the non-Federal sponsor are committed to the protection of the appropriate quantity, quality, timing, and distribution of water to ensure the restoration, preservation, and protection of the natural system as defined in WRDA 2000, for so long as the project remains authorized. This quantity, quality, timing, and distribution of water shall meet applicable water quality standards and be consistent with the natural system restoration goals and purposes of CERP, as the Plan is defined in the programmatic regulations. The non-Federal sponsor will protect the water for the natural system by taking the following actions to achieve the overarching natural system objectives of the Plan:*
>
> *Ensure, through appropriate and legally enforceable means under Federal law, that the quantity, quality, timing, and distribution of existing water that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report is available to the natural system, will be available at the time the Project Cooperation Agreement for the project is executed and will remain available for so long as the Project remains authorized.*
>
> *2a. Prior to the execution of the Project Cooperation Agreement, reserve or allocate for the natural system the necessary amount of water that will be made available by the project that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report.*
>
> *2b. After the Project Cooperation Agreement is signed and the project becomes operational, make such revisions under Florida law to this reservation or allocation of water that the Federal Government and the non-Federal sponsor determines, as a result of changed circumstances or new information, is beneficial for the natural system.*
>
> *3. For so long as the Project remains authorized, notify and consult with the Secretary of the Army should any revision in the reservation of water or other legally enforceable means of protecting water be proposed by the non-Federal sponsor, so that the Federal Government can assure itself that the changed reservation or legally enforceable means of protecting water conform with the non-Federal sponsor's commitments under paragraphs 1 and 2. Any change to a reservation or allocation of water made available by the project shall require an amendment to the Project Cooperation Agreement*